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RAILWAY
MECHANICAL ENGINEER

Design Features of Lightweight

Modern Locomotive Equipment-II*

A discussion of the development and research problems involved in the design of Timken lightweight reciprocating and rotating parts for locomotives

The previously published part of this article† related the importance of lightweight revolving and reciprocating parts and compared the weights, dynamic augment on the rail, and the maximum horizontal force on locomotives equipped with Timken high-dynamic-steel rods and locomotives equipped with plain-bearing rods. [Editor.]

Design of Column Section of Rods

The design of the column sections of the main and side rods is based on compression tests of full-sized tapered columns. The columns tested were machined from standard structural-steel I-beam sections to dimensions comparable with those of full-size main and side rods used in service. The object of these tests was to determine the load required to bring failure due either

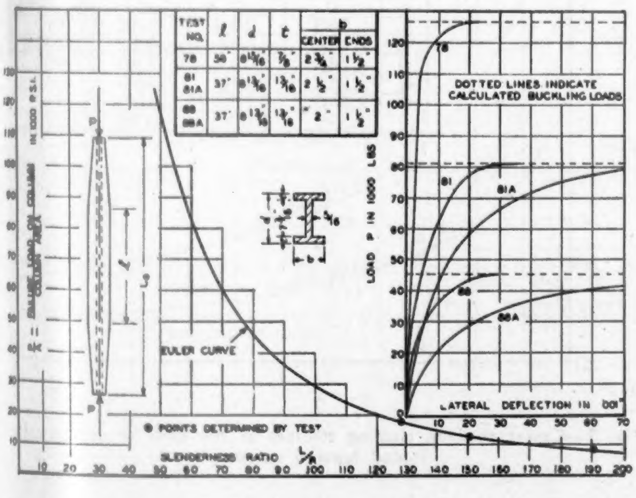


Fig. 5—Comparison of experimental and calculated buckling loads for tapered columns

to local yielding or to buckling. Only sufficient tests were made to satisfy the validity of formulas for the rational design of tapered columns.

The general shape and characteristics of the columns tested are shown by the sketches in Fig. 5. For a column tapered in the manner shown, the least moment of inertia of any cross section in the tapered portion at either end of the column is very nearly proportional to the cube of the ratio of the width of flange at that section to the width of flange at the end of the column. The buckling load for a pin-ended column of this kind is expressed by the equation

$$P_c = m\frac{EI}{L_0^2} = m\frac{EAR^2}{L_0^2} \qquad [1]$$

where E = Young's modulus (30×10^6); I = least moment of inertia of the uniform section at the center of the column; A = cross-sectional area of this section; R = least radius of gyration of the same section; L_0 = over-all length of the column; m = coefficient (Dinnick's factor) dependent on the ratios l/L_0 and i/I; l = length of uniform part of the column; and i = least moment of inertia of the section at either end of the column. Values of the coefficient m were taken from a table for pin-ended tapered columns given in Dinnick's work[3] and the buckling load was calculated for each column tested as shown in Table V.

For a uniform column, Equation [1] for the buckling load reduces to Euler's formula

$$P_c = \pi^2\frac{EI}{L^2}$$

or

$$\frac{P_c}{A} = \pi^2\frac{E}{(L/R)^2} \qquad [2]$$

where L = length of the uniform column; A = cross-sectional area; and R = radius of gyration of the cross section. From Equation [2] Euler's curve has been plotted in Fig. 5. A modified Euler curve could be drawn for each value of m encountered in the column tests, and individual test results could be compared with the corresponding curves. Instead of doing this, a simpler procedure was adopted for the comparison of test values with the values predicted by theory. For each column tested, the length L was calculated for an equivalent uniform column, having a cross section the same as that of the center part of the tapered column, which would buckle at the same load. Using this value of L, the test value of P_c/A for each column tested could

* Abstracted from a paper on "Modern Locomotive and Axle-Testing Equipment," by T. V. Buckwalter, O. J. Horger and W. C. Saunders, published in the transactions of the American Society of Mechanical Engineers, April, 1937, and presented before the semi-annual meeting, Detroit, May 17-21, 1937.

† Part I of this article was published on pages 348-351 of the August issue of the *Railway Mechanical Engineer.*

[3] "The Theory of Elasticity," by S. Timoshenko, McGraw-Hill Book Company, New York, 1936, p. 137.

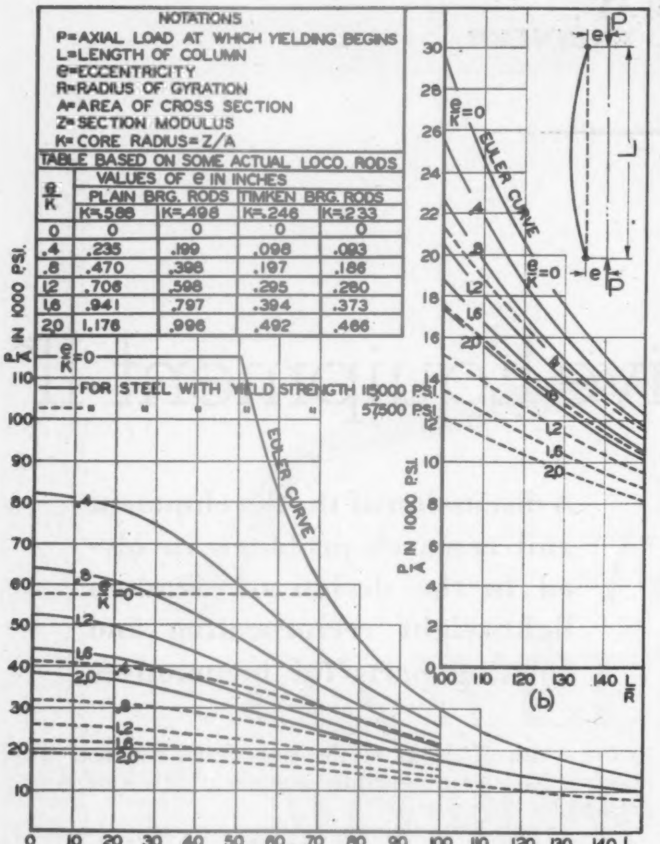


Fig. 6—Stress in columns of various slenderness ratios

be plotted against L/R for that column and the point so obtained should fall on Euler's curve.

Table V gives the dimensions and other data for three of the seventeen different designs of columns tested. The test results given in this table represent the results of five tests, one test on the first design and two each on the other two designs. In each case, the buckling loads for the two tests on the same design were identical. The load-deflection curves for these five tests are given in Fig. 5. The slope of each curve showing the lateral

Table V—Results of Tapered-Column Tests

Item	Test No. 78	Test No. 81 and 81A	Test No. 88 and 88A
d = depth of section, in.	$8\frac{15}{16}$	$8\frac{13}{16}$	$8\frac{13}{16}$
b = width of flanges at center, in.	$2\frac{1}{4}$	$2\frac{1}{2}$	2
A = area of I-section at center, sq. in.	7.06	6.30	5.49
I = least moment of inertia at center, in.^{4}	3.04	2.14	1.10
R = least radius of gyration at center = $\sqrt{(I/A)}$, in.	0.655	0.582	0.448
a = area of I-section at ends, sq. in.	4.86	4.67	4.67
i = least moment of inertia at ends, in.^{4}	0.507	0.475	0.475
l = length of uniform section, in.	58	37	37
L_0 = overall length of column, in.	83	83	83
l/L_0	0.70	0.45	0.45
i/I	0.166	0.220	0.431
m = Dinnik's factor	9.58	8.80	9.28
P_c = buckling load for column = mEI/L_0^2, lb.	127,000	81,500	45,400
P_c/A = average compressive stress at center, lb. per sq. in.	18,000	12,900	8,300
L = length of uniform column which would have the same buckling load, in.	84.2	87.8	85.5
L/R = slenderness ratio	128.5	150.8	191.0
P = buckling load from test, lb.	127,000	82,000	49,500

NOTE: Cylindrical blocks were used on ends of columns to give round-end conditions for the buckling tests.

deflection of the column at its center is due to slight and unavoidable imperfections in material, initial curvature of the column, and accidental eccentricity of the load applied in the test. For an ideal column, the curve would be truly vertical for loads up to the failure load. The actual curves are asymptotic to the horizontal dotted lines which show the theoretical calculated value of the buckling load for each column. The test value of P_c/A for each of the three designs listed in Table V is plotted against L/R in Fig. 5 as three points, which fall on the Euler curve. The close agreement of the experimental points with Euler's curve shows that the analytical work of Dinnik can be applied to find an equivalent value of L for a tapered column. This equivalent length will be greater than the actual length L_0 of the column, and the column may then be designed for safety from buckling or failure at the middle of the column as though it were a uniform column of length L. The experimental results presented in this paper in support of this idea were obtained from tests on tapered columns having very little eccentricity. However, additional tests on tapered columns were carried out in which the loads were applied with a deliberate eccentricity at both ends of the column. These tests showed that the correspondence between the measured deflections at the center of an eccentrically loaded tapered column and the calculated

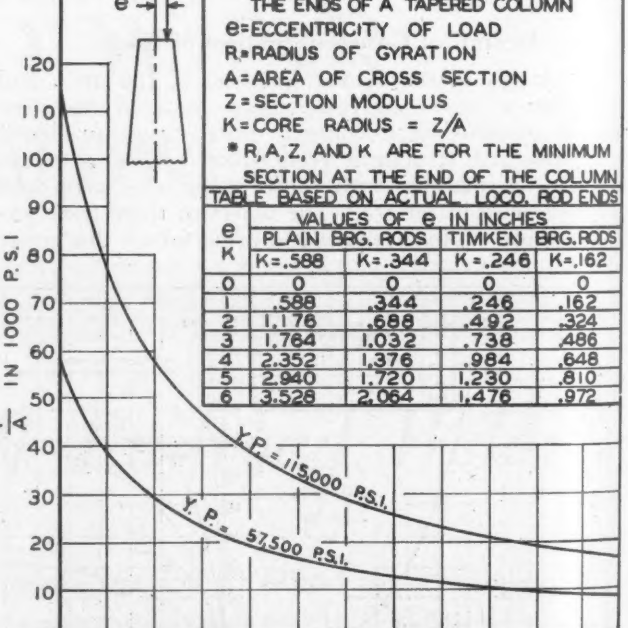


Fig. 7—Curves showing yielding stresses at the ends of eccentrically loaded tapered columns

deflections at the center of the equivalent uniform column, the length of which was determined as previously explained, was sufficiently close to warrant using the same equivalent length L for the design of a tapered column regardless of the amount of eccentricity assumed to exist in the application of loads.

With this in mind, we can proceed with a discussion of the failure of uniform columns. Euler's curve shown in Fig. 5 gives the buckling load for pin-ended columns with no eccentric loading. If we consider that a column has failed as soon as the yield-point strength has been exceeded, then the full-line curve designated as $e/k = 0$ in Fig. 6 gives the failure loads for columns with no eccentricity if the steel in the columns is of the Timken high-dynamic type, having a yield-point strength of 115,000 lb. per sq. in. The horizontal portion of this curve is below the value of L/R used for locomotive rods and is not of much interest to the designer. In a driving-

gear system, moreover, the load is sometimes eccentrically applied on the rod and develops stresses above the yield point as a result of the combination of bending stress with direct stress. The remaining full-line curves of Fig. 6 are also for a yield-point strength of 115,000 lb. per sq. in., and show the loads at which yielding at the center of a uniform column will begin for several assumed values of the ratio e/k. The curves shown in Fig. 6 were calculated using the equation

$$\frac{P}{A} = \frac{\text{Yield-point strength}}{1 + \frac{e}{k} \sec \frac{1}{2} \frac{L}{R} \sqrt{\left(\frac{P}{EA}\right)}} \qquad [3]$$

the notations for which are given in Fig. 6. The dashed-line curves of Fig. 6 give the same information as the full-line curves, only for a steel having a yield-point strength of 57,500 lb. per sq. in. Fig. 6 shows both groups of curves for values of L/R up to 150. In Fig. 6b is given that portion of the curves to an enlarged

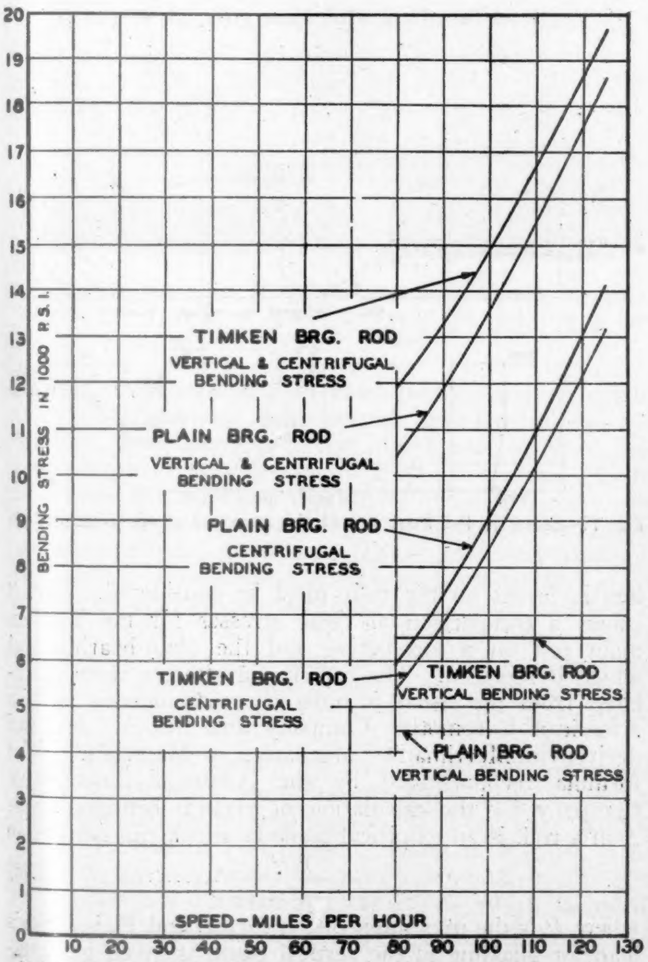


Fig. 8—Vertical bending and centrifugal stress in main rods

vertical scale for L/R values of 100 to 150 which are commonly used in locomotive-rod design.

The curves of Fig. 6 furnish a basis for the rational design of columns by assuming some eccentricity and utilizing steels with higher yield strength. The factor of safety for any column will be the ratio of the load at which the column will yield to the maximum load which the column must carry. It is apparent from Fig. 6b that with equal eccentric loading (say $e/k = 2.0$) the higher-yield strength steel will give a column strength 24 to 43 per cent greater than the lower-yield-strength steel for L/R ratios of 150 and 100, respectively. As mentioned before, the narrow width of the ends of the Timken rods and the well-maintained alignment of the driving axles and driving-rod system through the use of Timken roller bearings permits small eccentric loading compared to plain-bearing rods. Assuming that e/k may be reduced from 2.0 to 1.0, then Timken rods made from steel with a high yield strength will have a strength of from 40 ($L/R = 150$) to 76 per cent ($L/R = 100$) greater than plain-bearing rods of the same weight made from steel with low yield strength. Or by maintaining the same column strength in designs using both steels, the Timken rods will show a saving in weight.

While the curves of Fig. 6 illustrate saving in weight effected by using steel of high yield strength for uniform columns, we will also show by Fig. 7 that the use of the same steel gives additional weight saving by increasing the amount of taper which may be permitted at the ends of the columns or rods. When the ends of a column are tapered, failure may develop due to local yielding at the ends of the column before buckling or yielding occurs in the middle. The stress at the end of a column is independent of deflections, so that the maximum combined stress at the end of a tapered column is simply

$$\frac{P}{A} + \frac{Pe}{Z} \qquad [4]$$

where the notations are those in Fig. 7. To find the value of P/A at which yielding will begin at the end of a column it is only necessary to equate this stress to the yield-point strength of the material. Fig. 7 gives curves showing the values of P/A at which yielding will begin at the ends of a tapered column, one curve for the Timken high dynamic steel having a yield point strength of 115,000 lb. per sq. in., and the other for a steel having a yield strength of 57,500 lb. per sq. in. The curves

Fig. 9—Side rod in test setup showing arrangement of strain gages used to determine stress distribution in various eye sections

show that the value of P/A to cause yielding for a given column end section is directly proportional to the yield-point strength of the material used. In using the curves in Fig. 7 it should also be considered that here again much less eccentric loading may be expected on the narrow Timken rods than on the wide plain-bearing rods for the reasons previously mentioned.

On the basis of the test results and theoretical considerations presented previously in this paper, we conclude that tapered-column sections used in locomotive main and side rods may be designed for safety against sidewise bending and direct stress by the use of curves derived from rational formulas. It should be mentioned here that empirical formulas similar to those used by A.A.R. and locomotive builders do not permit the proper evaluation of the advantages to be obtained by using higher-yield-strength steel and tapered-column design.

Table VI—Summary of Stresses at Sections *U* and *N* of Side-Rod Eyes Shown in Fig. 10

	Section *U*: Stress, lb. per sq. in. P/2A (B)	Section *U*: Stress, lb. per sq. in. Test (C)	Section *U*: Ratios (C)/(B)	Section *U*: Ratios (D)/(E)	Section *N*: Stress, lb. per sq. in. P/2A (B)	Section *N*: Stress, lb. per sq. in. Test (C)	Section *N*: Ratios (C)/(B)	Section *N*: Ratios (D)/(E)
Design No. 1:								
Pin clearance = 1/64 in.	7,500	23,500(E)	3.13	1.13	7,500	11,300(E)	1.51	1.67
Pin clearance = 5/64 in.		26,500(D)	3.53			18,900(D)	2.52	
Design No. 2:								
Pin clearance = 1/64 in.	7,200	23,600(E)	3.28	1.20	6,500	9,600(E)	1.48	2.17
Pin clearance = 5/64 in.		28,200(D)	3.92			20,800(D)	3.20	

Fatigue Failure of Rods

Up to this point, only static failure of the columns has been considered, but the possibility of fatigue failure must also be investigated. Fatigue failures seldom occur

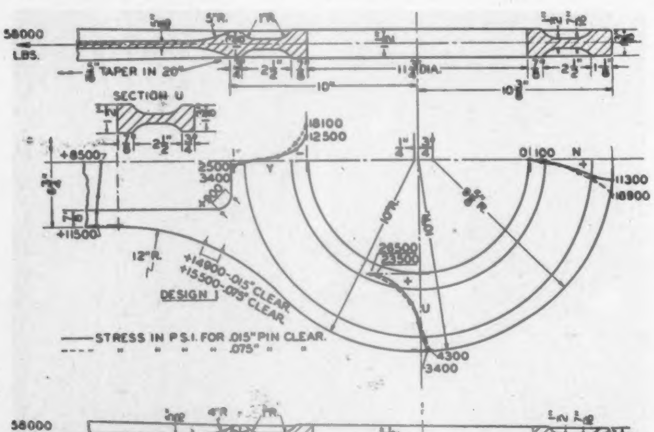


Fig. 10—Stresses and dimensions of side-rod eyes tested

in the uniform-column portion of the rod, but usually develop at the junction of the column with the eye (fatigue failures in the eye will be discussed later). In this region there is usually an abrupt change in section, and the bending and direct stresses are higher than the nominally calculated values due to stress concentration. The Timken-rod design gives comparatively uniform sections at the junction of the eye and column which results in less stress concentration and greater uniformity of strength of material than in plain-bearing rods. Danger of fatigue failure in the Timken rods is further reduced by the high fatigue strength of the high dynamic steel.

Vertical Bending and Centrifugal Stresses

At low speeds, only sidewise bending and direct stress need be considered. At high speeds, however, stresses due to vertical bending caused by the column load and

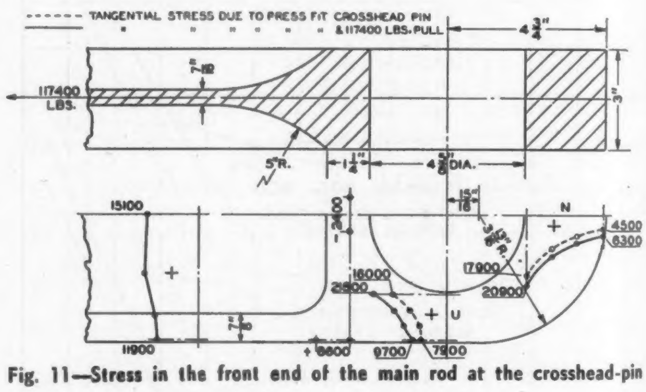


Fig. 11—Stress in the front end of the main rod at the crosshead-pin

inertia forces on the rods must be considered. Fig. 8 shows a comparison of these stresses for the Timken main rod on a locomotive and the plain-bearing rod which it replaced. The centrifugal stresses were calculated from the usual formula as recommended by the American Locomotive Company and the A.A.R., and derived in Merriman's "Mechanics of Materials." The formula recommended by the American Locomotive Company for the calculation of vertical bending stress S in a rod, is an empirical formula which can be written

$$S = \frac{P/2A}{1 - (P/2P_c)} \qquad [5]$$

where P is the maximum piston thrust, and P_c is Euler's load for buckling in the vertical plane as given in Equation [2], considering each rod as a round-ended column. The curves for vertical bending stress given in Fig. 8 were calculated from this formula. Fig. 8 shows also the combined stress, vertical bending plus centrifugal, for the Timken rod and the plain-bearing rod. It will be seen that the combined stress is slightly higher for the Timken rod because of its reduced section. The higher stress in the Timken rod is more than offset by the higher physical properties of the steel used as compared with the properties of the steel used for plain-bearing rods.

The practice of combining vertical with centrifugal stress, as in Fig. 8 is recommended by the American Locomotive Company. The standard practice of the A.A.R. is to combine direct stress due to a fraction of the full piston thrust with centrifugal stress. The latter

method would give slightly lower stresses than those shown by the curves in Fig. 8.

Design of Eye Ends of Driving Rods

A satisfactory analytical solution for the stresses in the eye ends of the main and side rods does not exist. This is due to the difficulty of determining the load distribution over the bore of the rod eye which depends upon the clearance between the eye and the bearing race. This clearance is a minimum for new parts and, since increased clearance results in higher stresses in the eye sections of the rod, the stresses in these sections become greater as the clearance increases under operating conditions. The purpose of these static tests on full-size eye sections, therefore, was (*a*) to investigate the stress distribution in various designs of eye sections, and (*b*) to determine the increased magnitude of these stresses due to increasing the clearance from minimum to maximum values anticipated in service. These tests were made on side rods and the knowledge obtained was applied in an analytical solution for the stresses in the main rods which are of similar design. In addition to the stresses measured in these static tests, stresses due to impact are present in the eye sections under operating conditions and this must be considered when a factor of safety is selected.

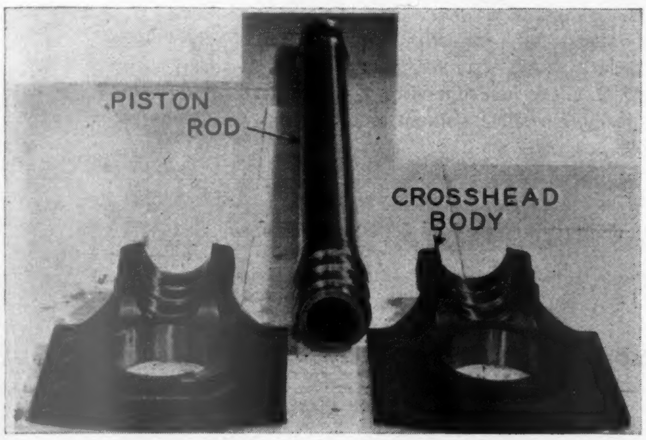


Fig. 12—The two halves of the die-forged crosshead body are bolted together over a system of annular grooves in the piston rod to form the crosshead connection

The method of loading the eyes of the side rod in the testing machine to determine the stress distribution by means of last-word strain gages of 1-in. gage length located at various I-sections is shown in Fig. 9. The complete stress distribution was determined in the eye section for ten different rod conditions which included the investigation of five different eye designs having various clearances between the eye and the outer race of the Timken bearing. A total of 1,300 strain-gage readings were made, most of which were obtained from tensile tests on the rods and the remainder from compression tests. A load of 58,000 lb. (one-half the piston thrust) was applied on the side-rod eye in all these tests which is in accordance with A.A.R. design specifications for the six-coupled passenger locomotive on which this rod application was made. The results of two of the tension tests on each of the two designs of eyes in Fig. 10 are shown graphically in that figure. Strain gages could not be mounted closer than $\frac{1}{16}$ in. from the boundary of the rod so that stresses at this position are given in the table of Fig. 10 rather than stresses extrapolated to the boundary.

Table VII—Summary of Stresses Due to Both 0.004-in. Press Fit of Crosshead Pin and 117,400-Lb. Pull on the Main Rod—See Fig. 11

	Section U	Section N
(A) Measured stress, lb. per sq. in.	21,800	20,900
(B) Stress P/2A, lb. per sq. in.	13,000	8,100
(C) Ratio (A) (B)	1.68	2.58

Referring to Fig. 10, it is apparent that the critical stresses measured in test occur at sections *N* and *U* with the latter showing the maximum stresses. Actually the maximum stresses exist a short distance from section *U*, depending upon the clearance in the eye, but the difference from the values shown would be small. Table VI, comparing the stresses in the two designs of the eye, shows slightly lower stresses for design 1 than for design 2, particularly with increased pin clearance. The thinner rim in design 2 would tend to increase the stress over design 1. The effect of $\frac{5}{64}$ in. pin clearance instead of $\frac{1}{64}$ in. clearance is to increase the stresses by 13 to 20 per cent at section *U*, but is of greater influence at section *N* where the stresses with $\frac{5}{64}$ in. clearance are 1.7 to 2.2 times as great as the stresses with $\frac{1}{64}$ in. clearance. The measured stresses given in the table in Fig. 10 for section *U* are 3.1 to 3.9 times the nominally calculated direct stresses, $P/2A$, and are 1.5 to 3.2 times as great as $P/2A$ at section *N*, which indicates the presence of considerable bending at these sections.

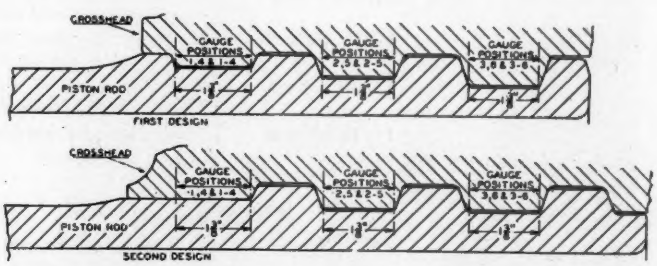


Fig. 13—Gage locations used in determining stresses in the piston rod

Table VIII—Total Stress in Piston Rod Due to Tightening Crosshead Bolts and to a Pull of 120,000 Lb.

	Design No. 1			Design No. 2		
Gage position as shown in Fig. 13	Stress due to tightening 6 bolts, lb. per sq. in.	Stress due to 120,000 lb. pull, lb. per sq. in.	Total stress, lb. per sq. in.	Stress due to tightening 6 bolts, lb. per sq. in.	Stress due to 120,000 lb. pull, lb. per sq. in.	Total stress, lb. per sq. in.
1	0	4,300	4,300	–9,500	19,000	9,500
4	1,300	–3,700	–2,400	–12,000	17,000	5,000
1-4	12,000	8,800	20,800	1,000	13,000	14,000
2	8,000	2,600	10,600	15,000	4,000	19,000
5	5,500	20,500	26,000	22,000	4,000	26,000
2-5	4,500	4,500	9,000	12,000	9,000	21,000
3	44,000	1,000	45,000	13,000	2,500	15,500
6	19,000	26,000	45,000	14,000	2,500	16,500
3-6	2,100	4,900	7,000	–600	5,600	5,000

NOTE: Stresses are those at the bottom of the annular grooves in the piston rod as shown by the gage positions in Fig. 13.

As a result of the test data given and additional tests not shown, the final design of rod introduced in service

(*Continued on page 405*)

Railway Fuel and Traveling Engineers' Association

Grand Ballroom, Hotel Sherman

Tuesday, September 28—General Session

Morning Session

10:30 o'clock	Convention called to order.
10:45 o'clock	Chairman's address by J. D. Clark, fuel supervisor, Chesapeake & Ohio.
11:00 o'clock	Address by M. J. Gormley, executive assistant to president, Association of American Railroads.

Afternoon Session

2:00 o'clock	Report on Fuel Records and Statistics, by E. E. Ramey, fuel engineer, Baltimore & Ohio.
	Address by Roy V. Wright, editor, Railway Mechanical Engineer.

Wednesday, September 29—Mechanical Day

Morning Session

9:30 o'clock	Report on New Locomotive Economy Devices, by A. G. Hoppe, assistant mechanical engineer, Chicago, Milwaukee, St. Paul & Pacific.
10:15 o'clock	Report on Steam Turbine and Steam Condensing Locomotives, by L. P. Michael, chief mechanical engineer, Chicago & North Western.
11:00 o'clock	Address by W. H. Flynn, general superintendent motive power and rolling stock, New York Central.
11:30 o'clock	Report on Front Ends, Grates and Ashpans, by Prof. E. C. Schmidt, University of Illinois.

Afternoon Session

2:00 o'clock	Report on Attention to Valve Motion and Its Effect on Fuel Economy, by M. F. Brown, fuel supervisor, Northern Pacific.
3:00 o'clock	Report on Utilization of Locomotives, by A. A. Raymond, supervisor of fuel and locomotive performance, New York Central.

Thursday, September 30—Air Brake Day

Morning Session

9:30 o'clock	Report on Air Brakes, by W. H. Davies, superintendent air brakes, Wabash.
11:00 o'clock	Address by L. K. Sillcox, first vice-president, New York Air Brake Company.

Afternoon Session

2:00 o'clock	Report on Locomotive Firing Practice—Oil, by R. S. Twogood, assistant engineer, Southern Pacific.
	Report on Locomotive Firing Practice—Coal, by W. C. Shove, general fuel supervisor, New York, New Haven & Hartford.

Friday, October 1—Fuel Day

Morning Session

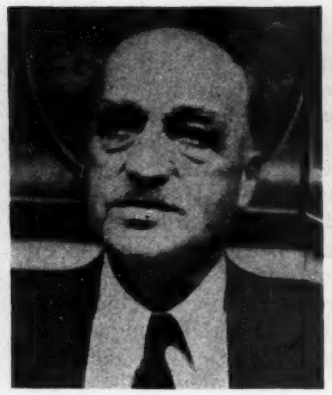
9:30 o'clock	Report of Subjects Committee.
9:45 o'clock	Report on Inspection, Preparation and Utilization of Coal, by W. R. Sugg, superintendent fuel conservation, Missouri Pacific.
	Address by Eugene McAuliffe, president, Union Pacific Coal Company.
	Report of Secretary-Treasurer T. Duff Smith.
	Report of Finance Committee.
	Report on Constitution and By-Laws.
	Election of Officers.

Afternoon

	No session scheduled in order that members may use all of this period for visiting exhibits.

C. I. Evans,
Vice Chairman

A. T. Pfeiffer,
Vice Chairman



F. P. Roesch,
Vice Chairman

T. Duff Smith,
Secretary-Treasurer

Fuel and Traveling Engineers

A consolidation of two powerful organizations meets at Chicago for first time Sept. 28—Oct. 1

J. D. Clark, Chairman

THE Railway Fuel and Traveling Engineers' Association will hold its first annual meeting in the Grand Ballroom of the Hotel Sherman, Chicago, September 28, 29, 30 and October 1. In point of program and tradition, however, it will not be a new association. Created by the merging of the Traveling Engineers' Association and the International Railway Fuel Association, it has a background of fine service to American railways, extending back for 45 years in the case of the former and 30 years in the case of the latter.

Traveling Engineers' Association

The Traveling Engineers' Association was organized January 9, 1893, in the office of Locomotive Engineering at the invitation of Angus Sinclair and John A. Hill, widely known as the creator of "Jim Skeever," whose "Object Lessons" are still fresh in the minds of the older men in railway service today. The chairman of the committee which issued the call for the meeting was C. B. Conger of the Chicago & West Michigan, who became the first president of the association organized that day "to improve the locomotive engine service of American railways." At the end of five years' service Mr. Conger was succeeded by D. R. MacBain, who later served as president of the International Railway Fuel Association and who was also president of the American Railway Master Mechanics' Association. Starting with a membership of 98 by the time of the first annual meeting held in September, 1893, it grew steadily. At the end of 10 years it had passed the 400 mark; at the end of 20 years it reached nearly 1,000, and for the five years ended with 1930 was above 1,500.

The membership policies of the Traveling Engineers' Association have been consistent throughout its history. Those eligible for active membership were traveling engineers or road foremen of engines and their assistants; promoted road foremen of engines; air-brake experts employed by the railroads and the manufacturers; general foremen, and roundhouse foremen. Associate members were "those whose knowledge of locomotive running and management will be of service to the association." Membership provisions were liberalized on several occasions, but only to the extent of making all general foremen and enginehouse foremen eligible, irrespective of former service as locomotive engineers, and by according associate members the privilege of promotion to full membership. The program of the association was developed consistently in keeping with the motto of the association "to improve the locomotive engine service of American railways."

A wide range of subjects has been covered in the pro-

ceedings. Among those most consistently included in the programs are air-brake and train handling, lubrication, and fuel economy. Smoke prevention commanded the attention of successive conventions for a number of years prior to 1918. The problems of employment and promotion in the engine service, including formulation of standard examinations, received considerable attention during the first 20 years of the association's history. Each new facility, such as the brick arch, the superheater and the stoker, as it came into use on the locomotive was the subject of study until it had become well established and its management generally understood. This part of the work of the association was, in fact, that of an organization of educators gathering material and formulating methods for the instruction of the men in the engine service.

One of the remarkable facts concerning the Traveling Engineers' Association is that this organization, one of the oldest in the field, was served as secretary throughout its history by one man—W. O. Thompson. Mr. Thompson was one of the organizers of the association and his secretaryship was unbroken until his death early in 1936.

Fuel Association Organized

When the Traveling Engineers' Association was 15 years old there came into being a new association designed to specialize on certain phases which had consistently been a part of the Traveling Engineers' program. On November 20, 1908, a group of some 40 persons met in Chicago for the purpose of organizing an association to advance the interests of the railroads by recommending the adoption of the best methods of purchasing, inspecting, weighing, distributing, handling and accounting for fuel. Membership in this organization was to include officers of railways and their assistants in charge of these functions as well as men in charge of fuel tests or economies on railways. Eligibility for associate membership included officers or representatives of concerns "engaged in production of fuel, either coal or oil, fuel handling, fuel-handling devices and equipment, fuel-consuming or labor-saving devices," and also men "whose general knowledge of fuel problems may be of value to the association." Eugene McAuliffe, then general fuel agent of the Rock Island-Frisco Lines, was elected president of this organization. At the time of the first annual meeting in June, 1909, the association had a membership of 200 and 117 were in attendance at the meeting.

Like the Traveling Engineers', this association prospered. At the end of 10 years its total membership was nearly 1,000. During the three or four years preceding the depression the active membership, consisting exclusively of railway men, exceeded 1,000, and the total membership varied from 1,400 to 1,600. In addition to the wide range of subjects included within the field which the association took for itself, it gradually devoted more and more attention to problems pertaining to the use of fuel. One of its most frequently repeated committee reports dealt with firing practice and another, of somewhat later origin, with front ends, grates and ash pans. The problems of locomotive maintenance effecting fuel economy were also constantly before the association.

In 1920 following the amalgamation of the Master Car Builders' and the American Railway Master Mechanics' Associations into the Mechanical Section of the American Railway Association, whereby these organizations lost their voluntary status, the question as to whether the so-called minor associations were to maintain their independence was raised in various ways. Both the Traveling Engineers' Association and the Fuel Association maintained their voluntary status and during the 1920's reached the peak of their success. During this period the Fuel Association contributed invaluable aid in the work of the Joint Committee on Fuel Conservation and Locomotive Utilization of the American Railway Association.

The Two Organizations Unite

Then came the depression. One of its early effects was to curtail association activities and, indeed, in the case of some of these organizations, to discontinue their activity completely. Following 1930 no meeting of the Traveling Engineers' Association was held until 1934, at which time a limited program was discussed by a meager attendance. No meeting of the International Railway Fuel Association was held in 1931 and 1932, although the reports and papers prepared for 1931 were published in a volume of Proceedings for that year. The meetings in 1933 and 1934 were limited in attendance. In 1935 the membership of the Fuel Association had dropped to 230. The situation seemed desperate from the viewpoint of both associations.

Thus was the soil prepared for the serious consideration by both bodies of the proposal that they combine their strength in a single association. This proposal was not new, although it had never received serious open consideration by either association. Many of the members and many other railway officers had long felt that the extent to which the programs of the two associations overlapped and the large overlap in membership made such a move highly desirable. Indicative of the overlapping membership is the list of men who had held the presidency of both associations. These included D. R. MacBain, W. C. Hayes, J. B. Hurley, J. N. Clark and J. M. Nicholson who presided at the meetings of both of these associations in 1934. Many others were active leaders in the work of both associations.

The union of the two associations into the Railway Fuel and Traveling Engineers' Association was ultimately completed in 1936. At that time simultaneous meetings of the two associations acted favorably upon the report of the Joint Committee recommending the merger and formulating the procedure for its accomplishment. The two organizations, each with a history of highly useful service to American railroads, are now joining forces in keeping with the logic of changed conditions and with renewed prospects of a continuing career of usefulness.

President Clark

James Daniel Clark, president of the association, is fuel supervisor of the Chesapeake & Ohio. He was born in Spotsylvania County, Va., January 27, 1883, and entered the service of the Chesapeake & Ohio as a fireman two days before Christmas, in December, 1903. He was promoted to locomotive engineer in 1911, became a traveling fireman in June, 1923, fuel instructor in August, 1924, and was made fuel supervisor, the position he now holds, in January, 1925. Mr. Clark was an active worker in both the International Railway Fuel Association and the Traveling Engineers' Association. He joined the Fuel Association in 1923, was elected a member of the executive committee in 1926, and vice-president in 1929. He was elected a member of the executive committee of the Traveling Engineers' Association in 1928 and vice-president in 1930. He was therefore the logical person to be elected to the presidency of the new association when it was formed a year ago.

Mr. Clark is a man of pleasing personality, yet direct

(*Continued on page 403*)

A. F. Stiglmeier,
Secretary-Treasurer

M. V. Milton, President

W. N. Moore,
Vice-President

Master

Boiler Makers Association

The Master Boiler Makers' Association will hold a two-day convention in the Crystal Room, Hotel Sherman, Chicago, Wednesday and Thursday, September 29-30, 1937. Evidence of the splendid way in which this organization has come out of the depression is indicated by the considerable number of pertinent committee reports scheduled in the program, in addition to the special addresses.

After five long years of inactivity, this association, in 1935, commenced its rehabilitation in the face of considerable objection and under the handicap of a depleted membership. The action taken at its first business meeting in that year, which replaced the conventions of former days, more or less paralleled that at the inception of the association in November, 1902, and about the same number of representatives from railway boiler departments were in attendance. With the background of usefulness to the railroads established over the 35 years of its existence, the renewal of member interest has been very rapid. At the meeting in 1936 more than 150 members demonstrated their loyalty to the association by attending, and in that year nearly 350 former members again became active.

As the time for the 1937 business meeting of the Master Boiler Makers' Association approaches, it is apparent that the energy and aggressiveness of the organization in its own behalf through the period of its rebirth is bearing fruit in an added prestige and in the support of railroad officials generally.

To find the reason for this present support and interest in the association, it is probably necessary to go back to the beginnings of the organization, for its fundamental ideals have never been altered in the face of changing conditions. The purpose then and now has been one of service to the railroads.

Organized in 1902

Having in mind the value of education in the advancement of any craft, a group of enterprising boiler-shop foremen and supervisors met in the assembly hall of the Lindell Hotel in St. Louis, Mo., on November 11, 1902, to consider the formation of an association of railway boiler supervisors. The meeting culminated in action which started the International Railway Master Boiler Makers' Association on its career. It was conceived solely as an organization of those in charge of the railway boiler departments and to be controlled by officers having the complete sanction of railway management.

The association had these objects in view—to bring together for discussion among its members various topics of interest; to promote the exchange of ideas and methods used by various railroads in building, inspecting and repairing locomotive boilers, and to hold frequent meetings to promote a better acquaintanceship among members and thus to improve the standing and widen the influence of this branch of the railway industry.

Other than the appointment of officers and the selection of topics for discussions at a 1903 meeting, little else was accomplished during the November, 1902, session. The officers elected at that time were: President, F. J. Graves, master boiler maker, Chesapeake & Ohio, Huntington, W. Va.; first vice-president, J. A. Doarnberger, Norfolk & Western, Roanoke, Va.; second vice-president, William H. Laughridge, Hocking Valley, Columbus, O.; secretary and treasurer, P. Sullivan, Big Four, Urbana, Ill.; assistant secretary, E. C. Cook,

Master Boiler Makers' Association

Crystal Room, Hotel Sherman

Tuesday, September 28

6:30 to 7:30 p.m.	Registration of Members and Guests.

Wednesday, September 29

Morning Session

7:30 to 9:30 a.m.	Registration.
10:00 a.m.	Business session.
10:05 a.m.	Meeting called to order.
	Annual address by President M. V. Milton.
	Routine business.
	Address by D. C. Buell, Director, Railway Educational Bureau, Omaha, Neb.
	Annual report of the Secretary-Treasurer.
	Miscellaneous business.
	New business.
	Appointment of special committees to serve during meeting.
	Memorials.
	Announcements.
	Topic No. 7. Topics for 1938 Meeting. George M. Wilson, Chairman.

Afternoon Session

1:15 to 1:45 p.m.	Registration.
2:00 p.m.	Meeting called to order.
	Committee report on topical subjects.

Topic No. 1. Pitting and Corrosion of Locomotive Boilers and Tenders. Louis R. Haase, district boiler inspector, Baltimore & Ohio, chairman. A representative of the Water Service Committee of the American Railway Engineering Association will discuss the report.

Topic No. 5. Improvements to Prevent Cracking of Firebox Sheets Out of Staybolt Holes. C. W. Buffington, general master boiler maker, Chesapeake & Ohio, chairman.

Topic No. 8. Law.—Myron C. France, general boiler foreman, Chicago, St. Paul, Minneapolis & Omaha, chairman.

Announcements.

Thursday, September 30

Morning Session

7:45 to 8:30 a.m.	Registration.
9:00 a.m.	Meeting called to order.
	Unfinished business.
	Annual address by Secretary-Treasurer Albert F. Stiglmeier.
9:30 a.m.	Address by Col. C. C. Stibbard, chief operating officer, Board of Railway Commissioners, Ottawa, Ont.

Topic No. 2. Autogenous Welding and Cutting as Used with the Fabrication of Boilers and Tenders. Albert F. Stiglmeier, foreman, boiler department, New York Central West Albany Shops, chairman. In the discussion of the report a special paper will be presented by the Welding Section of the National Electrical Manufacturers Association on Code Requirements for Welded Seams; one by the International Acetylene Association on Heat Effects on Sheets When Cut by the Acetylene Process; another from the Lincoln Electric Company on What the Development of Coated Electrodes Has Done for the Railroads; and one from the Lukens Steel Company on Heat Effects on Welded Sheets.

Topic No. 3. Proper Thickness of Front Tube Sheets.

Announcements.

Afternoon Session

1:30 to 1:45 p.m.	Registration.
2:00 p.m.	Meeting called to order.
	Announcements.

Topic No. 4. Improvements in Safe Ending and Application of Flues and Tubes. Frank A. Longo, welding and boiler supervisor, Southern Pacific, chairman.

Topic No. 6. What is Being Done to Prevent Back Tube Sheets from Cracking in Radius of Flange and Out of Tube Holes. Louis Nicholas, general boiler foreman, Chicago, Indianapolis & Louisville, chairman.

Report of chairman of Executive Board.

Election of officers.

For the good of the association.

Adjournment.

Railway Journal, St. Louis, Mo. Of this original group of officers, J. A. Doarnberger, and William H. Laughridge, present treasurer of the association, are still extremely active in the conduct of its affairs. At the first meeting 68 representatives were in attendance. These constitute the charter membership of the association.

The second convention was held May 19 to 21, 1903, at the Great Southern Hotel, Columbus, O. At this meeting the first committee reports were read and discussed with much interest and profit. That year 37 new members were added to the rolls of the association.

Rival Organizations

Through this period of its development a rival organization—the Master Steam Boiler Makers' Association, which also had been organized in 1902—grew to a position of such influence in the trade that steps were inaugurated in 1905 to amalgamate the two groups. Membership in the Master Steam Boiler Makers' Association was not confined to the railway boiler department but embraced the contract boiler and tank fields as well, with the result that membership in it had developed more rapidly than in the railway master boiler makers' group.

It was not until 1907, however, that complete accord was reached on the proposal to unite the two associations. In May of that year the first joint convention was held at the Hollenden Hotel, Cleveland, at which the name International Master Boiler Makers' Association was adopted to designate the combined organization. This union of rival groups brought the membership to 335. It was at this meeting that Harry D. Vought began his career as secretary of the association, which continued until his death in 1929.

In 1911, at the convention held at the Rome Hotel, Omaha, Neb., the International designation was dropped and the organization has since been known under its present name of Master Boiler Makers' Association. At that time the membership totaled 440 which indicates the increased interest that its work had developed throughout the craft.

Master boiler makers from every railroad were quick to realize the benefits to be derived from the organization and throughout its history, through good years and lean, this spirit never faltered. During the peak of activity in 1919, mainly through the efforts of Frank McManamy, then assistant director of operations of the United States Railroad Administration, the association boasted a membership of 631.

Never Stopped Fighting

Thus, well established and secure in a strong active membership, the association continued in a prosperous state throughout the 1920-1930 period with but little change in the procedure of working out its destiny. This riding the crest, however, came to an end with the evil days of the depression and the struggle of keeping an inactive association alive began. Under the guidance of Kearn E. Fogerty, of the Chicago, Burlington & Quincy, the president elected in 1930, and the present secretary, Albert F. Stiglmeier, general boiler foreman of the New York Central, and other officers, the problem was approached with courage and imagination.

While it was not possible to hold the 1931 convention, complete proceedings were published of all reports and addresses prepared for the meeting that year. These proceedings were distributed throughout the membership. Two years later, when no sign was forthcoming that a convention could be held, a complete "Convention in Print" was made available in October, 1933, through the medium of *The Boiler Maker.* This activity at the low point of the depression stimulated interest in the association and helped immeasurably its prestige in the minds of mechanical officials of the railroads. In 1935 the officers of the association aroused sufficient interest and support from railroad officials to hold a successful business meeting. Because of lack of funds this meeting was covered in *Boiler Maker and Plate Fabricator.*

Since then the return to former virility and influence of the association has been rapid. This year almost universal support from the railroads assures one of the most successful meetings since the inception of the Master Boiler Makers' Association.

President Milton

Montague Victor Milton, president of the Master Boiler Makers' Association, is chief boiler inspector of the Central Region of the Canadian National Railways. He was born in London, England, February 24, 1883, and attended the Mechanical Institute, Stratford, London, England. After serving as an apprentice on the Great Eastern Railway of England from March, 1897, to 1904, he went to Peru, South America, as foreman and inspector of the Peruvian Central Railway at Guadalupe and Lima. Leaving Peru in June, 1907, he became leading hand of the marine department of the Great Eastern Railway at Parkeston Quay, England. In 1908 he came to Canada, locating at North Bay, Ontario, as foreman and district inspector of the Canadian Pacific Railway. From June, 1915, to May, 1919, he was general boiler inspector of the Canadian Government Railways at Cochrane, Ont. In May, 1919, he was made boiler inspector of the Canadian National Railways, Western Region, becoming chief boiler inspector of the Central Region at Toronto, Ont., January, 1925, which position he now holds.

Mr. Milton became a member of the Master Boiler Makers' Association in 1925 and immediately demonstrated his interest by taking part in discussions of the various reports. He was drafted for committee service in 1928 and in 1935 was elected a member of the executive board. He is therefore well qualified for the presidency of the association.

Secretary-Treasurer Stiglmeier

Albert Frank Stiglmeier, secretary-treasurer of the Master Boiler Makers' Association, was born at Buffalo, N. Y., December 12, 1886. He received his education in the grammar schools and the International Correspondence Schools. From November, 1901, to November, 1905, he was a boiler maker apprentice in the Buffalo shops of the Delaware, Lackawanna & Western. As a journeyman he served with the following concerns in Buffalo—Tashenberger Brothers Company, Howard Brothers Boiler Works, Oldham Boiler Works, Barber Asphalt Paving Company, and with the New York Central at its Depew, New York, shops. From October, 1906 to 1908 he was journeyman boiler maker in the Buffalo, N. Y., shops of the Delaware, Lackawanna & Western, and then until April, 1912, was layer out and flanger in the same shop. He went with the Erie Railroad at Hornell, N. Y., May, 1912, as assistant boiler foreman, but a few months later, in July, was made general boiler department foreman. In December, 1912, he was made assistant boiler department foreman of the New York Central at its West Albany locomotive shops, succeeding to the position of general boiler department foreman in July, 1917; he remained in that position until April, 1919, when he became general boiler department foreman of the Baltimore & Ohio, at its Mt. Clare, Md., locomotive shops. He returned to the New York Central at its West Albany shops in November, 1923, as

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Car Department Officers' Association

Gray Room, Hotel Sherman

Tuesday, September 28

Morning Session

10:00 o'clock

Address by President K. F. Nystrom, superintendent car department, Chicago, Milwaukee, St. Paul & Pacific.

Address by a representative of the Association of American Railroads.

Address by Roy V. Wright, editor, Railway Mechanical Engineer.

Report of Auditing Committee.

Report of Secretary.

Report on Constitution and By-Laws.

Election of Officers.

Afternoon Session

2:00 o'clock

Address by C. J. Nelson, superintendent interchange, Chicago Car Interchange Bureau.

Address by W. L. Ennis, manager refrigeration and freight claim prevention, Chicago, Milwaukee, St. Paul & Pacific.

Wednesday, September 29

Morning Session

9:30 o'clock

Address by J. T. Gillick, chief operating officer, Chicago, Milwaukee, St. Paul & Pacific.

Address by LeRoy Kramer, vice-president, General American Transportation Corporation.

Address by A. F. Stuebing, railway mechanical engineer, United States Steel Corporation.

Afternoon Session

2:00 o'clock

Address by W. J. Patterson, chief, Bureau of Safety, Interstate Commerce Commission.

Discussion of A.A.R. Rules, led by M. E. Fitzgerald, chief car inspector, Chicago & Eastern Illinois.

Car Department Officers

The meeting, which will be held at Chicago September 28 and 29, is first since 1930

E. J. Robertson,
Vice-President

A. J. Krueger,
Vice-President

K. F. Nystrom, President

C. J. Nelson,
Vice-President

THE Car Department Officers' Association will hold a two-day meeting in the Gray Room of the Hotel Sherman, Chicago, on Tuesday and Wednesday, September 28 and 29, 1937.

This association came into being to meet a definite need which was widely felt among car-department officers and particularly among the chief interchange inspectors at the various important interchange points in America. The marked variation in interpretation of the M.C.B. interchange rules led the chief interchange inspectors to consider the advisability of an association, at the meetings of which some sort of agreement on interpretations might be reached. To Hugh Boutet, chief interchange inspector, Cincinnati, Ohio, belongs the credit for taking the initiative. He secured the support of his governing committee at Cincinnati and, on the authority of this committee, called a meeting at Cincinnati in April, 1898, at which seven interchange inspectors were present. The seven men who attended the first meeting were: Charles Waughop, St. Louis, Mo.; John Doyle, Columbus, Ohio; J. C. McCabe, Cleveland, Ohio; William Palmer, Toledo, Ohio; J. W. Baker, Kansas City, Mo.; E. E. Merriss, Lexington, Ky., and Fred Morgan, Chattanooga, Tenn.

Permanent Organization Effected

Following the initial meeting one or two others were held at various points on an informal basis until the Fall of 1899 when, at Cleveland, Ohio, a permanent organization was set up composed of the chief joint car inspectors. The object of the association was to develop uniform and correct interpretation of the interchange rules. Charles Waughop was the first president.

At St. Louis, Mo., in 1904, the constitution was revised to make car foremen eligible to membership, thus widening the influence of the association to include the smaller interchange points as well as the larger ones at which joint inspection bureaus were maintained. Mr. Boutet was elected president at the 1904 meeting and served through 1911. Since then a new president has been elected at each convention.

At the outset the membership was never large; there were scarcely more than ten or twelve members in the organization until after the change in the constitution made in 1904. Then the membership began to climb. In 1911 there were about 200 members and, in 1915, when the next step in broadening the activities of the association took place, there were 382 members.

Scope Broadened

In 1915 a movement was started to increase the scope of the work of the association by providing a place on the program for individual papers. The president that

year, F. H. Hanson of the New York Central, suggested that a group of committees should be set to work on car-department subjects to present reports at the meeting. In actual practice, however, the movement started at that time resulted in individual papers rather than committee reports.

The first effort along this line was a contest for papers on car-department apprenticeship, $50 in prize money being donated by an interested member of the association. A number of good papers were developed in this contest and presented at the 1916 meeting. At that meeting a further broadening of the membership was effected by making car inspectors, M.C.B. bill clerks or any others actively engaged in the work of the car department eligible for membership.

The war intervened to postpone further active work by the Chief Interchange Car Inspectors' and Car Foremen's Association until September, 1919. At that meeting a membership of 508 was recorded. The program was confined strictly to the discussion of the rules, probably because of the lack of time to develop individual papers. In 1920 the membership had dropped back to 349. In 1921 the association held no full convention, but the members attended an open meeting of the executive committee in March to discuss proposed changes in the interchange rules and held a similar one-day meeting early in January of the succeeding year which was confined strictly to a discussion of the rules then going into effect. No association business was transacted.

In November, 1922, a full convention was held, at which, in addition to the usual discussion of the rules, an excellent program of individual papers was presented. For the next four years the association continued to meet regularly each year, with programs of fine quality, including papers on a wide range of car department problems.

At the meeting in September, 1926, it was decided to change the name of the association to the Railway Car Department Officers' Association, with the object of encouraging and prompting car-department supervisory officers of all ranks to become members of the association. At the time of this meeting the total membership was 1,300.

Rival Springs Up

In the meantime, a new regional organization of car-department supervisors had sprung up in the Southwest. This was known as the Southwestern Master Car Builders' and Supervisors' Association, which headed up in and around St. Louis and made an aggressive play for the support of the car-department officers throughout the Southwest. Following the 1926 meeting of the Railway Car Department Officers' Association a strong movement for merging the two associations got under way and negotiations were carried through to a satisfactory conclusion in time to call a general convention of the two organizations in 1928, at which plans for consolidation were placed before their respective memberships. These plans were approved and the merged organization named the "Master Car Builders' and Supervisors' Association."

The membership of this organization comprised master car builders and all car-department men employed in a supervisory capacity. Its membership was, therefore, somewhat restricted from that of the Car Inspectors' and Car Foremen's Association which, in 1916, removed all restrictions except employment in the car department. The purpose of the new organization was "to promote more efficient maintenance and use of cars by the discussion of interchange rules and all branches of car-department work not now given detailed consideration by the Mechanical Division of the American Railway Association." This association held two conventions after the reorganization—one in 1929 and one in 1930, at which time the name was changed to "Car Department Officers' Association." At that meeting the officers now in charge of the association were elected and no meeting has since been held owing to the depression.

The character of the program since the reorganization has not greatly changed. Some attempt was made, however, to systematize the handling of questions concerning the interpretation of the interchange rules by referring them to committees. The old practice of open discussion of the new rules was continued.

Membership Requirements

The history of this association records a movement tending toward the removal of restrictions to membership which ultimately placed no restrictions whatever on any class of car-department employees who wished to join. The movement which resulted in the change in the name of the association in 1926 to Railway Car Department Officers' Association and the development in the Southwest of a rival association at about the same time are both indications that the association had gone too far in letting down the bars. The result was a lack of interest on the part of the responsible car-department officers so that the membership of the association was largely drawn from the chief interchange car inspectors, other car inspectors, M.C.B. bill clerks, and other minor supervisors and employees. With its present membership requirements this association has an opportunity to deal effectively with many car-department problems which are not dealt with now and are not ever likely to be dealt with by the Mechanical Division. There is no less need for the association now than when it was organized. It simplifies the work of the Arbitration Committee and has the field of car-department-supervision problems all to itself.

President Nystrom

K. F. Nystrom, superintendent car department, Chicago, Milwaukee, St. Paul & Pacific, was born in Sweden in September, 1881, and was educated in that country, graduating from the university in 1904 as a mechanical engineer. Coming to this country he was a draftsman with the Pressed Steel Car Company from 1905 to 1909. He was on the engineering staff of the Pullman Company for a short time, after which he entered the car design department of the Southern Pacific in 1909. In 1911 he was made assistant mechanical engineer for the American Car & Foundry Company, leaving that position in 1912 to become mechanical engineer of the Acme Supply Company. From 1913 to 1918 he was chief draftsman of the car department of the Grand Trunk, and then for two years was chief draftsman, car department, Canadian Pacific. He returned to the Grand Trunk in 1920 as engineer car construction, leaving that company in 1922 to become engineer car design, Chicago, Milwaukee, St. Paul & Pacific. From 1925 to 1927 he was engineer of motive power and rolling stock of that road, and then in July, 1927, became master car builder, being advanced in September of the same year to superintendent of the car department.

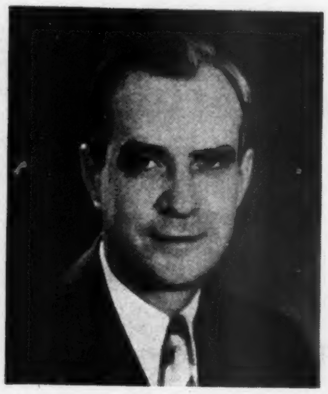
Prior to taking his present position in 1927 Mr. Nystrom was largely concerned with problems of equipment design. He has since demonstrated also a marked capacity in an administrative position as a leader of men. He is aggressive, progressive, and has contributed possibly as much as any one other railroad official to the art of building railway equipment, using carbon or low alloy steels, by the welding process, without sacrifice of

(*Continued on page 404*)

General Foremen's Association

Lost out on only three annual meetings during depression—Meets in Chicago Sept. 28-29

F. B. Downey,
First Vice-President



J. W. Oxley,
Second Vice-President

F. T. James, President

C. C. Kirkhuff,
Third Vice-President

W. F. Hall,
Secretary-Treasurer

THE International Railway General Foremen's Association will hold its annual convention in the Rose Room, Hotel Sherman, Chicago, on Tuesday and Wednesday, September 28-29, 1937.

While this association did not attempt to hold meetings in 1931, 1932 and 1933, it did hold two-day sessions in 1934, 1935 and 1936. President A. H. Keys, who was elected at the 1930 meeting, functioned over this period, being succeeded at the convention a year ago by F. T. James. William Hall, the secretary-treasurer of the organization, gave much time and energy to the interests of the association during the depression years, and while the two-day sessions in the past three years have not been largely attended, a nucleus of the membership has continued to function quite actively, all things considered. Unfortunately, because of failing health, Mr. Hall was forced to retire from the work of the association last spring, and no successor has as yet been selected. President James and his associates in office, however, in spite of this handicap, have built up a strong, constructive program for the coming convention.

In order better to understand the importance of this organization it may be well briefly to review its history and objectives.

While attending a railway convention in Indianapolis in 1904 a shop foreman from Shreveport, La., approached E. C. Cook, then managing editor of the Railway Journal, asking him to aid in establishing an association for enginehouse foremen. After seeking the advice of a number of shop foremen and representatives of various railway supply companies, Mr. Cook laid the foundation for establishing the I.R.G.F.A., enlarging the scope of the organization to include all shop superintendents and all general foremen, including assistants. Having decided on this course, he published articles in the Railway Journal suggesting the plan and immediately obtained many enthusiastic responses. About 100 foremen endorsed the plan and became charter members.

As a result a meeting was held at St. Louis, Mo., on September 7, 8 and 9, 1905. By the time it adjourned the charter membership list had grown to 225 members covering nearly every railroad in the United States and some in Canada. A constitution and by-laws were adopted, which incorporated the name of the association as it is today, with a view of including in its membership all railway shop foremen not allied with other mechanical associations, and especially general foremen, shop superintendents, enginehouse foremen, division foremen, district foremen, machine-shop foremen and their assistants.

The first officers of the association were: President, W. H. Graves, general foreman, C. & A. Ry., Roodhouse, Ill.; first vice-president, C. A. Swan, Jr., C. & A., Roodhouse, Ill.; second vice-president, E. F. Fay, general foreman, Union Pacific, Cheyenne, Wyo.; third

International Railway General Foremen's Association

Rose Room, Hotel Sherman

Tuesday, September 28

Morning Session

9:30 o'clock

Opening Ceremonies.

Opening Address. How Can the Mechanical Supervisor be of Greater Assistance to the Railroad Management, by R. E. Woodruff, vice-president, Erie Railroad.

How Long Can We Put Off Training Men—Locomotive and Car Department Mechanics—Supervisors, by H. J. Schulthess, chief of personnel, Denver & Rio Grande Western.

Discussion.

Afternoon Session

2:00 o'clock

Mechanical Supervisors and Public Opinion, by Roy V. Wright, editor, Railway Mechanical Engineer.

Modern Methods in Freight Car Building and Repair, by J. E. Echols, foreman freight car repair shop, Norfolk & Western.

Freight Car Repairs at Keyser Valley, D. L. & W. Railroad, by J. Thompson, general foreman, car department, Delaware, Lackawanna & Western.

Discussion.

Wednesday, September 29

Morning Session

9:00 o'clock

Open Forum. A three-hour roundtable discussion of subjects presented by members pertinent to locomotive back shop, enginehouse and passenger and freight car problems.

- What to Teach About Safety.
- Improving Work Methods.
- Controlling Wastes.
- Does Low Stock Inventory Pay.
- Winning Co-operation.
- Material Reclamation.
- Maintenance of Special Equipment Applied to Locomotives.
- Maintenance of Freight Equipment.
- Care and Maintenance of Shop Tools.
- Need for Trained Mechanics, Touching on Apprentices.

Afternoon Session

2:00 o'clock

Can Modern Machine Tools Cut Repair Costs, by L. H. Scheifele, tool and material inspector, Reading Company.

Handling Unsafe Practices About Locomotive and Car Shops, Enginehouses and Repair Yards, by R. C. Helwig, safety agent, Delaware & Hudson.

Discussion.

vice-president, Lee R. Laisure, assistant general foreman, Erie, Hornellsville, N. Y.; fourth vice-president, W. E. Farrell, enginehouse foreman, Big Four Ry., Delaware, O.; secretary-treasurer, E. C. Cook, managing editor, Railway Journal, St. Louis, Mo. William Hall, recently retired secretary, was one of the charter members of the association.

Quoting from the constitution: "The objects of this Association shall be the mutual improvement of its members by exchanging ideas by means of annual meetings and the reading and the discussion of papers; the general exchange of views along lines pertaining to railway locomotive shop practices, so that we may all profit by the experience of others in our line of railway work and also be of greater value to the companies employing us, and to those for whose interest we labor." This section still stands as it did 32 years ago.

In the early meetings of the association the subjects discussed included repair methods and controversial subjects such as electricity versus steam power, electricity versus oil for headlights, and the advisability of cooling locomotives. Later they included design, operation and organization of enginehouses and shops, with continued attention being given to methods and equipment for improving shop efficiency.

At the 1911 annual meeting committee reports were submitted on the promotion of shop efficiency, shop organization, development of personnel, and specialization and standardization of work. A committee on railway shop kinks and the value of such devices reported that an elaborate illustrated book on "Railway Shop Kinks" had been compiled under the supervision of the committee by the mechanical department editor of the Railway Age Gazette; it was composed largely of a great number of shop kinks published during the previous two years in the Mechanical Edition of the Railway Age Gazette (now the *Railway Mechanical Engineer.*)

For several years the trend of discussion was the same as that at the 1911 meeting, but with the scope becoming broader and broader, thereby making the foreman's outlook on these subjects relatively more important to himself and to the railroad, and crystallizing the foreman's point of view of his work in relation to general shop problems.

In 1930 the twenty-fifth annual meeting of the association was held at the Hotel Sherman, Chicago, September 16 to 19, inclusive, with a total registration of 365. Reports presented at this convention included such subjects as engine-truck maintenance and lubrication; cost of material delays to locomotives and cars; stabilization of mechanical shop forces; inspection, maintenance and repairs to gas-electric rail cars; general foremen's contribution to fuel economy; and better maintenance of passenger-car equipment. These subjects indicate further the general trend of the problems discussed by the General Foremen's Association as the years progressed. Subjects apropos of modern railway development, including maintenance of Diesel locomotives, production methods in locomotive repairs, and maintenance of high-speed passenger equipment also have been discussed.

As indicated at the beginning of this article, the association did not attempt to hold conventions in 1931, 1932 and 1933, although its officers, and particularly its secretary-treasurer, William Hall, were ever on the alert to resume activities the moment conditions would permit. Two-day meetings were held in Chicago during September of 1934, 1935 and 1936. The attendance was, of course, subnormal, but interest in association activities was maintained at a fairly high point, considering the conditions under which the organization was attempting to operate.

From the earliest meetings when subjects were more or less devoted to immediate shop problems involving maintenance methods to later meetings when subjects involved the relation of shop organization, production methods and development of personnel for the purpose of improving motive-power and rolling-stock as well as general transportation efficiency, the purpose of the Association has always been the interchange of ideas pertaining to better maintenance and production methods, organization and personnel, thereby benefiting the railway industry as a whole.

President James

Frederick T. James is general foreman, motive power, of the Delaware, Lackawanna & Western Railroad at Kingsland, N. J. He was born at Buffalo, N. Y., March 16, 1894. He worked at various occupations while attending grammer school and the first year of high school, and became a machinist apprentice at Farrar & Trefts Machine & Boiler Works, Buffalo, in July, 1908; he has, however, continued his educational training more or less continually ever since. This included courses in civil service and government at Bryant & Stratton Business College, Buffalo; and machine-shop practices and automobile mechanics at the Buffalo Y.M.C.A. He has acted as chairman of foremanship courses at Hoboken, N. J., under the New Jersey State Vocational Education Department, and has taken lectures and discussions in shop employee psychology at the State Normal School at Montclair, N. J. He also took a special electrical course at the Paterson, N. J., Vocational School prior to the electrification of the metropolitan suburban section of the Lackawanna.

In September, 1909, he became a roundhouse utility worker at East Buffalo, on the Lackawanna. For some months in 1911 he was assigned to the master mechanic's office, in connection with the compilation of special locomotive performance reports, later being promoted to coal chute foreman at East Buffalo roundhouse, and then acting as a machinist at the East Buffalo locomotive shop. He was made general foreman at Groveland, N. Y., in October, 1915, and erecting-shop foreman at East Buffalo, February, 1918, and filled various positions until he was assigned in February, 1923, as special locomotive and boiler inspector on the Buffalo division. On November 1, 1923, he was transferred to Binghamton as day roundhouse foreman, and on February 18, 1924, was promoted to general foreman at the Kingsland, N. J., locomotive shop. Since he has been in charge at that point a shop has been developed for handling the electrical equipment and much of the work previously done at the Dover, N. J., frog and switch shop has also been transferred to Kingsland.

He was secretary of the Lackawanna Foremen's Association at East Buffalo from 1918 to 1922, and was First Lieutenant, Engineers, 491st Division, Reserve Officers, from 1925 to 1935. He was elected president of the International Railway General Foremen's Association, September, 1936.

Mr. James is of a quiet and reserved nature and in coming to a decision insists on having all of the pertinent facts in a case clearly before him. Maintaining an open mind and thorough-going to the core, he has made an excellent record as a supervisor and also in the promotion of safety. A keen student of the basic principles of supervision and of the technique of dealing with workers, he has been unusually successful as a foreman. His ability to adjust himself successfully to radically changed conditions was clearly demonstrated when the metropolitan suburban section of the Lackawanna was elec-

(*Continued on page 404*)

Allied Railway Supply Exhibit

Will exceed the previous Chicago shows in the variety of products and importance of improvements

E. S. FitzSimmons, President

L. B. Rhodes,
First Vice-President

J. W. Fogg,
Second Vice-President

C. F. Weil,
Third Vice-President

F. W. Venton,
Fourth Vice-President

IN pre-depression days the Hotel Sherman, Chicago, was a beehive of activity both during the well-attended annual spring conventions of railway fuel men and during the equally well-attended fall conventions of the traveling engineers. No small part of the interest in these conventions centered about the accompanying exhibitions of railway mechanical equipment and supplies. There were exhibits also at the meetings of the various mechanical department associations that met during the year at Chicago, or elsewhere. It is highly gratifying to note that the exhibits to be shown this year by the Allied Railway Supply Association, in conjunction with the joint mechanical association meetings at the Sherman, September 28 to October 1, promise to exceed in

M. K. Tate,
Fifth Vice-President

H. S. Mann,
Sixth Vice-President

J. E. Gettrust,
Secretary

G. R. Boyce,
Treasurer

variety of products displayed and especially in the important character of the many improvements demonstrated any previous show of railway mechanical equipment and supplies held in Chicago.

As a matter of fact, the actual number of exhibitors this year, as this issue goes to press is only 96 companies whereas 126 companies exhibited in 1929, and 125 companies in 1930, the last year when a railway exhibit was provided at any of the fall meetings. The same amount of floor space is utilized, however, namely, about 14,000 sq. ft., in the main exhibition hall, club room, and mezzanine floor of the hotel. Of this area, a total of 10,836 sq. ft. of actual display space will be utilized, consisting of 263 numbered spaces, each 6 ft. square, and 4 sections, A, B, C, and D, aggregating 38 spaces more, or making a total of 301 spaces.

Practically all of this exhibition space will be fully occupied and almost every type of railway mechanical equipment and supplies will be on display, ranging from boiler compounds to lock nuts, and from equipment specialties to the latest improved materials and tools. It is probably conservative to say that improvements effected in these new materials, devices and tools, as a result of intensive research and development since the last exhibit was held in 1930, exceed the improvements which it was possible to show at any previous convention. Railway mechanical supervisors will find this exhibition both highly interesting and informative and a potent reason to advance to their respective managements in asking permission to attend the association meetings.

What The Allied Railway Supply Association Is

Over a considerable period of years, but culminating during the depression, the sentiment of responsible railway and supply company officers pointed to the urgent need for reducing the number of specialized mechanical association meetings, either through amalgamation, or the holding of joint meetings at the same time and place, without loss of individual association identity. This would permit a single exhibit to replace six or seven exhibits held in as many weeks at different times throughout the year, with proportionately greater expense both to railways and supply companies. The co-ordination of railway association activities has been, and is still being, studied by a special committee of the Mechanical Division, consisting of John Purcell, Santa Fe; E. B. Hall, North Western, and F. R. Mays, Illinois Central. Much of the detailed work in conjunction with co-ordination studies, and especially the arrangement for the present joint meetings, has been done by F. P. Roesch, Standard Stoker Company, and T. Duff Smith, secretary, Railway Fuel & Traveling Engineers' Association.

For the supply interests, the possible advantages of a single exhibit were first recognized quite a number of years ago by such men as F. N. Bard, Barco Manufacturing Company; Irving H. Jones, Cleveland, Ohio; J. W. Fogg, MacLean-Fogg Lock Nut Company; F. W. Venton, Crane Company; G. R. Boyce, A. M. Castle & Company; C. M. Hoffman, Dearborn Chemical Company; J. J. Cizek, Leslie Company, and Joseph Sinkler, Chicago. Through the effective work of these men, ably supplemented by other supply company representatives, the Allied Railway Supply Association, Inc., was organized at Chicago on May 4, 1931, thus combining in one association the supply groups affiliated with the following seven railroad associations: Traveling Engineers' Association, Air Brake Association, International Railway General Foremen's Association, Master Boiler Makers' Association, International Railway Fuel Association, Railroad Master Blacksmiths' Association, and the Car Department Officers' Association.

The finances of these various supply groups were pooled; their respective presidents became vice-presidents of the new association; their secretaries became members of the executive committee, and Irving H. Jones was elected first president. The present officers of the association to whom credit must go for the notably constructive exhibit which will be held at the Hotel Sherman, Chicago, during the latter part of this month, are as follows: President, E. S. FitzSimmons, Flannery Bolt Company, Bridgeville, Pa.; first vice-president, L. B. Rhodes, Vapor Car Heating Company, Washington, D. C.; second vice-president, J. W. Fogg, MacLean-Fogg Lock Nut Company, Chicago; third vice-president, C. F. Weil, American Brake Shoe & Foundry Company, Chicago; fourth vice-president and assistant treasurer, F. W. Venton, Crane Company, Chicago; fifth vice-president, M. K. Tate, Lima Locomotive Works, Inc., Lima, Ohio; sixth vice-president, H. S. Mann, Standard Stoker Company, Inc., Chicago; secretary, J. F. Gettrust, Ashton Valve Company, Chicago; treasurer, G. R. Boyce, A. M. Castle & Company, Chicago.

The work involved in getting up an exhibition of this kind is quite staggering in the amount of detail involved, and it was highly essential, therefore, to divide the task among as many men as practicable. In addition to the officers of the association, four committees, comprising a total of 47 men, have participated in the preparatory work of getting ready for this convention and exhibition.

Registration Committee

The registration committee, under the direction of Chairman R. T. Peabody will assist the various associations in registering their respective members as they arrive.

R. T. Peabody, chairman, Air Reduction Sales Co., New York
Dan Hall, Hunt-Spiller Mfg. Corp., South Boston, Mass.
Roger Q. Milnes, Dearborn Chemical Co., Chicago
E. H. Weaver, Westinghouse Air Brake Co., Cleveland, Ohio
H. E. McCandless, Simmons-Boardman Publishing Corp., New York
William Jones, Oxweld Railroad Service Co., Chicago
C. M. Rogers, Locomotive Firebox Co., Chicago
R. H. Jenkins, Nathan Mfg. Co., Roanoke, Va.
J. J. Clifford, Wilson Engineering Corp., Chicago
P. R. Austin, Johns-Manville Co., Chicago
G. W. Taylor, Locomotive Finished Material Co., Atchison, Kan.
R. K. Smith, J. S. Coffin, Jr., Co., Joliet, Ill.
J. L. Bacon, Valve Pilot Corp., New York

Reception Committee

The reception committee, headed by Chairman Richard Welsh, includes the following members:

Richard Welsh, chairman, Nathan Manufacturing Co., Chicago
R. A. Carr, Dearborn Chemical Co., Chicago
E. J. Collins, Oxweld Railroad Service Co., Chicago
E. J. Reardon, Locomotive Firebox Co., Chicago

Hotel Committee

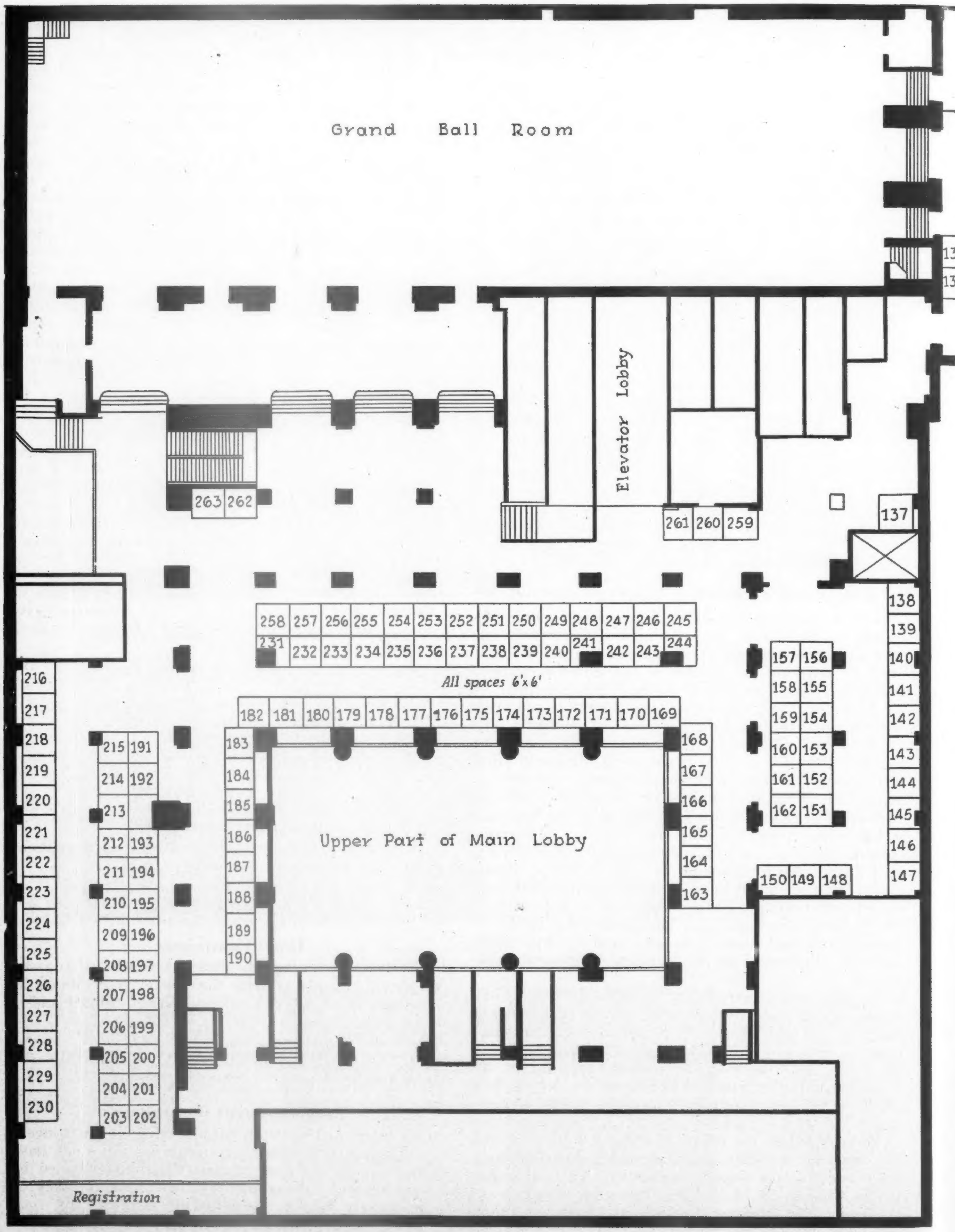
The hotel committee, the duties of which are to assist convention attendants with their hotel reservations, is under the leadership of Chairman Joseph Sinkler and is made up as follows:

Joseph Sinkler, chairman, Joseph Sinkler, Inc., Chicago
C. W. Sullivan, Markham Supply Co., Chicago
John Ash, Edna Brass Mfg. Co., Cincinnati, Ohio
John E. Long, Franklin Railway Supply Co., Chicago
R. N. Sinkler, Corley Company, Jersey City, N. J.

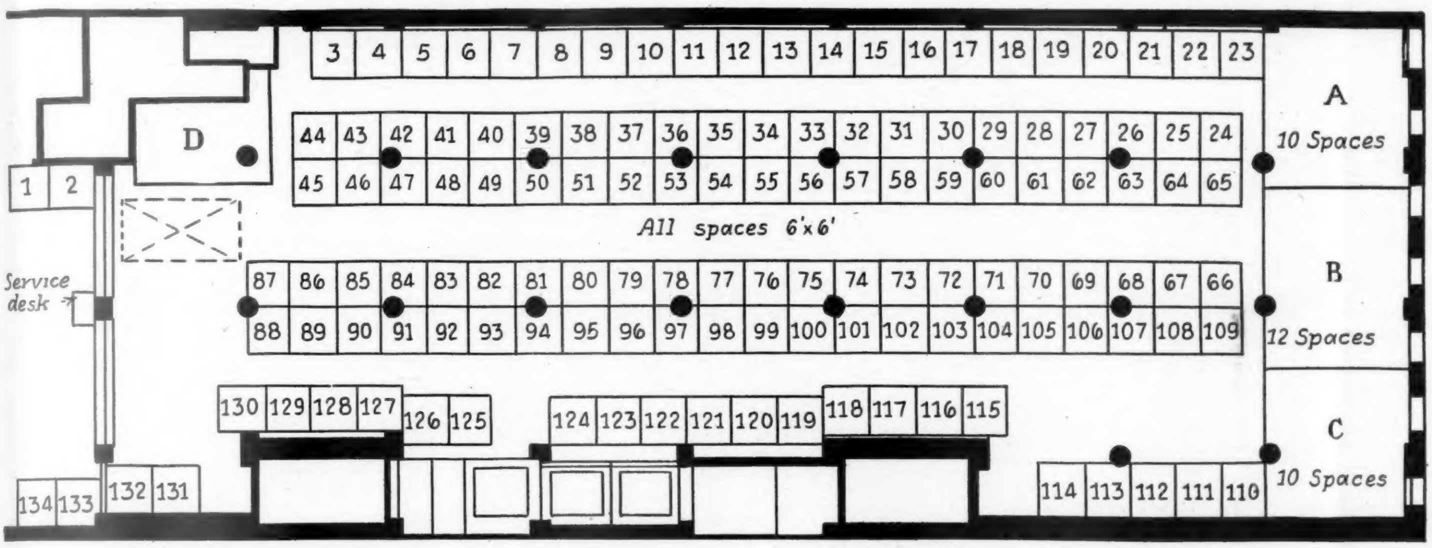
Entertainment Committee

An important, if non-technical, feature of the convention is the entertainment, arrangements for which have been made by the entertainment committee, headed by Chairman J. W. Fogg and Vice-Chairman Bradley S. Johnson. It includes the following members:

J. W. Fogg, chairman, MacLean-Fogg Lock Nut Co., Chicago
B. S. Johnson, vice-chairman, W. H. Miner, Inc., Chicago
John Baker, Locomotive Firebox Co., Chicago
R. A. Carr, Jr., Dearborn Chemical Co., Chicago
E. E. Thulin, Duff-Norton Mfg. Co., Chicago
M. K. Tate, Lima Locomotive Works, Inc., Lima, Ohio



Arrangement of exhibit spaces in Hotel Sherman



Arrangement of exhibit space in the main exhibition hall

E. J. Fuller, Hunt-Spiller Mfg. Corp., South Boston, Mass.
Howard W. Dillon, Paxton Mitchell Co., Omaha, Neb.
Richard Welsh, Nathan Mfg. Co., Chicago
E. H. Weaver, Westinghouse Air Brake Co., Cleveland, Ohio
Carl A. Millar, Clinch & Co., Chicago
C. F. Weil, American Brake Shoe & Foundry Co., Chicago
L. A. Rowe, MacLean-Fogg Lock Nut Co., Chicago
T. O'Leary, Jr., Johns-Manville Sales Corp., Chicago
Geo. E. Haas, Pyle-National Co., Chicago
Tom R. King, O. K. Co., Chicago
Wm. Leighton, Oxweld Railroad Service Co., Chicago
Henry S. Mann, Standard Stoker Co., Inc., Chicago
Bard Browne, Superheater Co., New York
L. B. Rhodes, Jr., Vapor Car Heating Co., Inc., Washington, D. C.
C. O. Jenista, Barco Manufacturing Co., Chicago
F. W. Venton, Crane Co., Chicago
T. Duff Smith, Railway Fuel & Traveling Engrs'. Assn., Chicago
E. L. Woodward, Railway Mechanical Engineer, Chicago
H. A. Morrison, Railway Age, Chicago

President FitzSimmons

E. S. FitzSimmons, vice-president of the Flannery Bolt Company, has for many years been active in the Boiler Makers Supply Men's Association, which has been associated with the Master Boiler Makers' Association, becoming president of the Allied Railway Supply Association last year.

He was born at Columbus, Ohio, April 12, 1876, and was educated in the grammar and high schools of Horton, Kan., and in the International Correspondence Schools. After serving as apprentice and journey mechanic with the Chicago, Rock Island & Pacific at Horton, Kan., he left that company in May, 1899, to become foreman boiler maker on the Delaware, Lackawanna & Western at Scranton, Pa. From August, 1904, to April, 1905, he was general boiler inspector of the New York, New Haven & Hartford, and then until August, 1907, was general master boiler maker of the Erie System. He then became master mechanic on the Erie at Galion, Ohio, and in February, 1908, was transferred in the same capacity to Hornell, N. Y. In January, 1912, he was promoted to mechanical superintendent of the Erie Lines West, being transferred in September, 1914, to mechanical superintendent of the Erie Lines East, with headquarters at New York, resigning in May, 1918, to become works manager of the McCord Manufacturing Company, Detroit, Mich. He became western manager of the Wilson Welder & Metals Company, Chicago, in April, 1919, leaving that position at the end of the year. He became associated with the Flannery Bolt Company as service engineer in January, 1920. He was made sales manager of the same company in 1922, and vice-president in February, 1936.

Mr. FitzSimmons, while foreman boiler maker of the D. L. & W. at Scranton, became a member of the original Master Steam Boiler Makers' Association at its charter meeting in October, 1903. Being extremely active in the work of this organization he was elected a first vice-president in 1905, and with other officers of that and the sister organization—the International Railway Master Boiler Makers' Association—worked indefatigably for the union of the two groups. This was accomplished in 1907 and Mr. FitzSimmons became first vice-president of the new International Master Boiler Makers' Association. His activities were soon transferred to the supply field and he became equally interested in the success of the Master Boiler Makers Supply Men's Association which had been formed in 1905.

Secretary Gettrust

Joseph F. Gettrust, secretary of the Allied Railway Supply Association, is a native of Baltimore, Md., and was educated in the public schools of that city. He has been employed by the Cincinnati, Indianapolis, St. Louis & Chicago (now the C. C. C. & St. L.), the Ohio & Mississippi Railroad (now the Baltimore & Ohio), the Galena Oil Company, and is now representative of the Ashton Valve Company at Chicago. He is a past president of the Air Brake Appliance Association and also of the Railway Equipment Association. As secretary of the Allied Railway Supply Association he has been one of a small coterie of men who have labored unceasingly and most effectively during recent months for a successful exhibit. He is familiarly known in the railroad field as "Joe." His principal avocation is salt water fishing in the pleasant waters off the Florida coast.

The Exhibit

The list of exhibitors, with the products which they will show, and the names of representatives in attendance, follows:

Air Reduction Sales Company, New York. Spaces 224, 225 and 226.

Alfol Insulation Company, Inc., New York.—Alfol panel insulation for refrigerator cars; Alfol jacket insulation for refrigerator cars; Alfol insulation for locomotive boilers; Alfol insulation for passenger, dining, baggage, mail and tank cars. Represented by D. D. Grassick, L. T. Sibley and John E. P. Morgan.

American Arch Company, Inc., New York.—Security locomotive arch brick; Security circulator; suspended arches and side walls for boiler plants, furnaces, etc. Represented by B. A. Clements, George A. Price, I. D. Brandon. S. MacClurkan, J. P. Neff, A. F. Becker, Thomas Mahar, G. M. Bean, T. M. Ferguson, William Haag, T. F. Kilcoyne, E. T. Mulcahy. W. E. Salisbury, M. R. Smith and A. M. Sucese. Spaces 79, 80, 81, 94, 95 and 96.

American Brake Shoe & Foundry Company, New York.—Member of Allied Railway Supply Association, but not exhibiting.

American Locomotive Company, New York.—Alco reverse gear; Alco staybolts; lateral cushioning device; springs; Universal spring plates; E-Z-On journal box lids; forgings; rods; valve gear parts; Diesel

parts. Represented by N. C. Naylor, W. S. Morris, W. A. Callison and W. F. Lewis. Spaces 26, 27, 28, 29, 60, 61, 62 and 63.

American Steel Foundries, Chicago. — Models of Simplex high-speed freight car trucks and Spring-plankless self-aligning freight car trucks; models of roller bearing units for passenger cars and locomotives; hardened and ground pins and bushings. Represented by F. H. Bassett, R. W. Clyne, S. M. Goodrich and F. H. Norton. Space 56.

American Throttle Company, Inc., New York. — See The Superheater Company.

Apex Tool & Cutter Company, Inc., The, Shelton, Conn.—Inserted forged tools for roughing and finishing tires and wheels; tools for journals and wheel seats of axles; adjustable tools for wheel centers; tools for lathes, shapers, planers and boring mills; standard tools for Morton draw-cut shaper. Represented by F. J. Wilson and H. M. Sheridan. Space 150.

Arrow Tools, Inc., Chicago.—Small forged tools, including chisels, beading tools, back out punches, etc.; safety tool retainers for pneumatic riveting and chipping hammers. Represented by N. W. Benedict and H. J. Trueblood. Space 242.

Ashton Valve Company, The, Boston (Cambridge), Mass.—Locomotive muffled and open pop safety valves; dustproof, illuminated double dial locomotive steam and quadruplex air brake gages; back pressure gages; single and duplex air brake gages; test gages; dead-weight gage testers; wheel press recording gages and attachments; locomotive driving wheel quartering gages; protected dial gages; inspectors' testing and proving outfits. Represented by J. F. Gettrust, John Welsh and Charles Gaston. Spaces 10 and 11.

Barco Manufacturing Company, Chicago.—Barco flexible joints; Barco all-metal steam, air, oil and water connections between locomotive and tender; Barco all-metal steam heat connections between cars and for rear of tenders; Barco float type low water alarms; Barco power reverse gears; Barco automatic smoke box blower fittings. Represented by F. N. Bard, C. L. Mellor, W. J. Behlke, F. B. Nugent, J. L. McLean, W. T. Jones, C. C. Cox, N. B. Robbins, L. J. Lytle and C. E. Allen. Spaces 66, 67, 108 and 109.

Barrett-Christie Company, Chicago.—Wells band saw; Delta files; Coffing chain hoists. Represented by Harry Barrett, R. P. Kemp, J. K. Adams, Bob Christie, George F. Hornberger, C. E. Millard, Orin E. Ash, H. N. Hayes and J. R. Coffing. Spaces 254, 255, 256 and 257.

Bird-Archer Company, The, New York. — Proportionate wayside water treatment equipment, including M.A., mechanically agitated proportioning unit; HA, hydraulically agitated proportioning unit, BP, briquette proportioning unit; and various combinations of briquetted, power and liquid chemicals. Represented by C. A. Bird, L. G. Calder, H. C. Harragin, A. C. Melville, H. C. Hutton, J. B. Davis, E. Ruggles and S. P. Foster. Spaces 239, 240, 241, 248, 249 and 250.

Brewster Company, Morris B., Chicago.—See T-Z Railway Equipment Company.

Brubaker & Bros. Company, W. L., Millersburg, Pa.—Taps; dies; reamers. Represented by W. Searls Rose. Space 120.

Burden Iron Company, Troy, N. Y.—Staybolt iron; engine bolt iron; Trojan iron. Represented by J. C. Kuhns, and H. T. Henry. Space 227.

Cardwell Corporation, The, Peoria, Ill.—Space 247.

Champion Brake Corporation, Chicago.—Champion hand brake. Represented by R. K. Ashton, J. M. Allen, R. Bergendahl and E. E. Van Cleave. Space 215.

Cleveland Steel Tool Company, The, Cleveland, Ohio.—Punches; dies; rivet sets; pneumatic and hand chisels; punch and die holders; Lacerda boiler tools. Represented by Harry W. Leighton, Ralph J. Venning and H. A. Lacerda. Space 258.

Coffin, Jr., Company, The J. S., Englewood, N. J.—Coffin feedwater heater system, showing recent improvements in design and application; locomotive Superdraft. Space D.

Corley Company, The, Jersey City, N. J.—Corley A.A.R. "OK-tagonal" pipe unions and combination union fittings. Represented by Ralph A. Corley and Robert N. Sinkler. Spaces 118 and 119.

Crane Company, Chicago.—Crane A.A.R. valves, unions, union-fittings and fittings; high-pressure specialties including locomotive blow-off and pop safety valves. Represented by Fred W. Venton and J. H. Gibson. Spaces 216, 217 and 218.

Dampney Company of America, The, Hyde Park, Boston, Mass.—Apexior surfaced boiler plate and boiler tube steel; glass boilers showing Apexiorized and bare metal flues in steaming operation. Represented by C. J. Hunter, J. D. Bird and C. M. Boling. Spaces 191 and 192.

Dearborn Chemical Company and Electro-Chemical Engineering Company, Chicago—Feedwater treatment chemicals; automatic proportioning wayside treatment equipment; Dearborn automatic constant blow-off; signal foam-meter electromatic blow-off; No-Ox-Id rust preventives. Represented by George R. Carr, R. A. Carr, F. B. Horstmann, S. C. Johnson, R. Q. Milnes, L. O. Gunderson, C. M. Hoffman, H. B. Crocker, C. C. Rausch, L. O. Brown, R. A. Dalton, J. W. Nutting, R. L. Oliver, B. H. Stone, F. R. Liggett, W. H. Hinsch, Don Bodishbaugh, R. J. Maginn and F. J. Boatright. Space C.

Detroit Lubricator Company, Detroit, Mich.—Locomotive mechanical lubricators; Bulls-eye hydrostatic locomotive lubricators; automatic flange oilers; "Genuine Detroit" oil feed dividers; automatic oil reducer; flange oiler feed shoe; "Genuine Detroit" air conditioning controls and accessories. Represented by C. C. King, C. E. Sperry, E. F. Milbank and J. F. Page. Spaces 138, 139, 140 and 141.

Dri-Steam Valve Sales Corporation, New York.—D. S. locomotive separator; D.S. dome throttle valve with separator; D.S. dome throttle valve without separator; D.S. front end throttle valve; D.S. locomotive auxiliary separator; D. S. boiler drum separator and pipe line separator. Represented by A. DeChiara, I. D. Toner, W. D. Scott and C. T. Schreiber. Spaces 12 and 13.

Duff-Norton Manufacturing Company, The, Pittsburgh, Pa.—Lifting jacks of all types; rotary air-motor power jacks; ball bearing, self-lowering governor controlled jacks; ball bearing standard speed jacks; ball bearing journal jacks, 10 to 50 tons capacity; ball bearing empty freight car jacks; self-lowering bridge and wrecking jacks; automatic lowering jacks up to 20 tons capacity; trip or track jacks; telescope screw jacks; jacks for pulling and pushing. Represented by C. N. Thulin and E. E. Thulin. Spaces 133 and 134.

Edna Brass Manufacturing Company, The, Cincinnati, Ohio.—Locomotive appliances. Represented by John T. Ash, H. A. Glenn and William Beck. Spaces 121 and 122.

Electro-Chemical Engineering Corporation, Chicago.—See Dearborn Chemical Company.

Ewald Iron Company, Louisville, Ky.—Samples of staybolt iron and engine bolt iron. Represented by W. R. Walsh. Space 214.

Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio.—Hollow and solid staybolt iron bars; hollow and solid finished staybolts. Represented by E. J. Raub, G. K. Maischaider and J. T. Doyle. Spaces 127 and 128.

Flannery Bolt Company, Bridgeville, Pa.—Locomotive boiler staybolts; installation tools; inspection instruments. Represented by W. T. Kilborn, E. S. FitzSimmons, William M. Wilson and William C. Masters. Spaces, 110, 111, 112, 113 and 114.

Franklin Railway Supply Company, Inc., New York.—Franklin type E power reverse gear; Precision type F-1 power reverse gear; Franklin type E-2 radial buffer; Franklin sleeve joint; McLaughlin joint; Franklin compensator and snubber; Franklin car connection; booster throttle valve; booster roller bearing idler gear; booster cylinder cock control type S, booster slip control valve; booster inlet check valve. Represented by W. H. Winterrowd, W. T. Lane, J. E. Long, and D. I. Packard. Spaces 73, 74, 75, 76, 77, 78, 98, 99, 100, 101 and 102.

Garlock Packing Company, The, Palmyra, N. Y.—Mechanical packings for railway equipment. Represented by R. J. Hinkle, H. J. Ramshaw and R. W. Chambers. Spaces 166, 167 and 168.

Gilg, Henry F., Pittsburgh, Pa.—Dunkirk staybolt steel samples made by the Ludlum Steel Company; Gilg valve for boiler washing and filling, steam, oil and gasoline; Magic portable lamp guard. Represented by Henry F. Gilg, J. W. Place, J. C. Campbell and Miss Martha M. Gilg. Space 125.

Goddard & Goddard Company, Detroit, Mich.—Profile and formed type milling cutters; milling cutters adapted to railway work; gear hobs; thread cutters; inserted blade expansion reamers. Represented by C. W. Davison, S. H. Gratan and C. S. Goddard. Spaces 178 and 179.

Graham-White Sander Corporation, Roanoke, Va.—Graham-White manual control and remote control sanders; Graham-White special hook-up for selective sanding; Graham-White manual control and automatic control sand spreader; Graham-White sanders for light-weight, high-speed trains and other Diesel units; Doarnberger type boiler wash-out plugs; Graham-White tilting spring car snubber. Represented by James Frantz, Virgil L. Frantz, Frank H. Cunningham and Clyde Keever. Spaces 40, 41, 48 and 49.

Grip Nut Company, Chicago.—Reception booth. Represented by John H. Sharp, L. W. Kass, E. H. Weigman, T. E. Scully and E. W. Hibbard. Spaces 231, 232 and 233.

Gustin-Bacon Manufacturing Company, Kansas City, Mo.—Lock-Tite pins; locomotive cab seats; locomotive cab side ventilators; emergency brake pipe repair couplings; locomotive throttle rod stuffing boxes; locomotive air pump strainers; brake pipe clamps. Represented by Glenn R. Miller, W. E. Davis and Roy P. Williamson. Spaces 180 and 181.

Holland Company, Chicago.—Holland Volute friction bolster springs. Represented by Cyrus J. Holland and Cyrus E. Holland. Spaces 219 and 220.

Hulson Grate Company, Keokuk, Iowa.—Tuyere-type locomotive grates with unit finger castings. Represented by H. N. Gardner, J. W. Hulson and A. W. Hulson. Spaces 145, 146 and 147.

Hunt-Spiller Manufacturing Corporation, South Boston, Mass.—Rough and finished locomotive parts of Hunt-Spiller Air Furnace Gun Iron, including cylinder bushings, piston valve bushings, cylinder and valve packing rings consisting of standard Duplex and Dunbar sectional rings, combination iron and bronze, Duplex sectional rings and Duplex lip sectional rings of both bronze and combination bronze and iron; Hunt-Spiller Z-type plate pistons; Hunt-Spiller light-weight piston valve with Duplex sectional valve packing rings; three-piece sectional packing rings for air pump and power reverse gear service. Represented by V. W. Ellet, E. J. Fuller, F. W. Lampton, D. F. Hall and C. L. Galloway. Spaces 71 and 72.

Huron Manufacturing Company, Detroit, Mich.—Huron washout plugs; Huron arch tube plugs; Huron smoke chamber inspection plug; Huron direct steaming connection; Huron Stapax journal lubricators; tools. Represented by R. J. Sherlock, P. C. Cady, A. C. Ruse, George F. Morgan, L. E. Hassman and B. R. Wetherby. Spaces 185 and 186.

International Correspondence Schools, Railroad Department, Scranton, Pa. —Sample lessons. Represented by C. G. Ash, C. H. Dailey and A. C. Drynan. Spaces 221 and 222.

Lehon Company, The, Chicago.—Mule-Hide cab curtain canvas; Mule-Hide canvas car roofing; Mule-Hide waterproofing and insulating materials; various Mule-Hide specialties for railway cars. Represented by Tom Lehon, J. W. Shoop, H. A. Wolfe, J. E. Eipper and R. J. Mulroney. Space 223.

Leslie Company, Lyndhurst, N. J.—Leslie Tyfon whistles; steam heat reducing valves. Represented by S. I. Leslie and J. J. Cizek. Space 33.

Lima Locomotive Works, Inc., Lima, Ohio.—Photographs of locomotives. Represented by M. K. Tate. Space 97.

Lincoln Electric Railway Sales Company, The, Cleveland, Ohio.—Charts, photographs, etc., concerning electric arc welding. Represented by J. E. Buckingham, J. A. Coakley, Jr., E. W. P. Smith and J. L. Johnson. Space 137.

Lockhart Iron & Steel Company, Pittsburgh, Pa.—XX Vulcan engine bolt iron; Vulcan bloom staybolt iron; Vulcan iron forging billets for locomotive draw and safety bars and passenger car equalizers. Represented by John Porter Gillespie. Space 177.

Locomotive Equipment Division, Manning, Maxwell & Moore, Inc., New York.—Turbo-injector; live steam injector; globe and angle valves; thermometers; tank level indicators; whistles; safety valves; gages. Represented by C. L. Brown, C. H. Butterfield, C. W. Corning, W. J. Hall, F. J. McGourty, N. P. Selover, J. Soule Smith and L. W. Lewis. Spaces 234 and 235.

Locomotive Firebox Company, Chicago.—Nicholson thermic syphons; Cyclone front ends; Christy engine truck lubricators; syphon sanders. Represented by W. S. Carr, G. R. Carr, L. R. Pyle, John Baker, C. M. Rogers, Fred Bramley, E. J. Reardon, M. A. Foss and E. Frank Smith. Space A.

Lunkenheimer Company, The, Cincinnati, Ohio.—Valves and lubricating devices for railroad service, including all patterns of Lunkenheimer "A.A.R." valves. Represented by Harry A. Burdorf and W. George Cook. Spaces 3 and 4.

MacLean-Fogg Lock Nut Company, Chicago.—M-F. lock nuts; M-F nut locks; M-F water-tight bolts; M-F lock-tight floor clips; M-F defect card receptacles; M-F dust guards. Represented by J. A. MacLean, J. W. Fogg, J. A. MacLean, Jr., A. W. MacLean, L. A. Rowe, W. G. Willcoxson, M. Flanagan, H. J. Clarity and A. B. Nilsen. Spaces 103, 104 and 105.

McCabe Manufacturing Company, Lawrence, Mass.—Cold flanged front flue sheet, 1-in. thick. Represented by Fred H. McCabe. Spaces 7 and 8.

Miner, Inc., W. H., Chicago.—Small models of friction draft gears and truck spring snubbers. Represented by Bradley S. Johnson. Space 263.

Modern Supply Company, Chicago. — Drills; reamers; beading tools; chisels; chisel blanks; rivet sets; pins and bushings for locomotive and car spring and brake rigging; staybolt and engine bolt iron; car and locomotive shop jacks; locomotive spring bands; brake shoes; iron and steel castings. Represented by W. F. Weber, A. A. Walker, R. E. Mann, Earle A. Mann, Thomas Jameson, Merle P. Smith and C. A. Dunn. Space 260.

Monarch Packing & Supply Company, Chicago.—Allpax packings; Allpax gasket cutter; Monarch "V" ring packings; Monarch fibrous and semi-metallic packings. Represented by Stanley MacDole, C. C. Humberstone, W. J. Forbes and W. P. Lyons. Space 126.

Nathan Manufacturing Company, New York. — Injectors; lubricators; boiler checks; low water alarms; water columns; drop plugs; whistles. Represented by C. J. Banning, J. F. Farrell, R. H. Jenkins, H. G. Cook, B. E. Folke, J. A. Kelly, F. Ehredt, W. S. Harris and Richard Welsh. Spaces 34, 35, 54 and 55.

National Aluminate Corporation, Chicago. — Water treating equipment; water testing equipment; automatic continuous blowdown equipment. Represented by P. W. Evans, C. B. Flint, C. M. Bardwell, B. D. Barger, J. L. Callahan, R. E. Falkinburg, J. L. Gibboney, R. V. Lucas, V. E. McCoy, H. A. Marshall, E. M. Miller, H. D. Shaw and T. G. Windes. Spaces 155, 156, 157 and 158.

National Tube Company, Pittsburgh, Pa.—Spaces, 198, 199 and 200.

Oakite Products, Inc., New York.—Methods for cleaning air-conditioning equipment; materials for washing steamliners; methods for stripping paint from locomotive tanks and coaches. Represented by J. C. Leonard, B. C. Browning, C. Johnson, L. B. Johnson, H. L. Gray and J. A. Carter. Spaces 1 and 2.

Okadee Company, Chicago.—Blow-off valves; tender hose couplers; steam and air-operated cylinder cocks; cylinder cock operating valves; automatic drain valves; water glass protectors; centrifugal blow-off separators. Represented by A. G. Hollingshead, J. F. Raps and C. W. Ploen. Spaces 30, 31 and 32.

O'Malley Valve Company, Edward, Chicago. — Tripl-disc valves; valve reclamation; master valve reseaters. Represented by Edward O'Malley, Sr., Edward O'Malley, Jr., and S. C. Boston. Space 42.

Oxweld Railroad Service Company, The, Chicago.—Oxy-acetylene welding and cutting apparatus. Represented by F. C. Hasse, William Jones, I. A. Smith and J. L. Hoffman. Spaces 183 and 184.

Paige-Jones Chemical Company, Chicago.—See National Aluminate Corporation.

Paulson Tools, Inc., The, Chicago. — Beading tools, chisels and chisel blanks; rivet sets. Represented by A. A. Walker, Earle A. Mann and Charles Loucks. Space 259.

Paxton-Mitchell Company, Omaha, Neb.—Paxton-Mitchell metallic piston rod, valve stem and air pump packing; slip joint and expansion joint packing for high pressure and exhaust steam pipes on Mallet locomotives; special locomotive iron castings. Represented by James L. Paxton, Jr., James J. Keliher and E. M. Hendrickson. Spaces 123 and 124.

Penn Iron & Steel Company, Creighton, Pa.—Samples of hand-puddled wrought iron, including staybolt, engine bolt and chain iron qualities; physical test specimens, including pull tests, etch tests, bend tests, thread tests, etc. Represented by Charles J. Nieman and J. P. Moses. Spaces 106 and 107.

Pilliod Company, The, New York.—Redesigned Baker valve gear equipped with Multirol precision bearings; McGill Multirol precision bearings. Represented by R. H. Weatherly and F. Fisher. Spaces 36, 37, 52 and 53.

Pocket List of Railroad Officials, The, New York.—Copies of The Pocket List of Railroad Officials. Represented by B. J. Wilson. Space 182.

Prime Manufacturing Company, The, Milwaukee, Wis.—Prime cylinder protection valves; Prime square thread washout plugs; Prime perfect circle bushing grinders. Represented by C. K. Ramp and H. B. Nelson. Spaces 135 and 136.

Pyle-National Company, The, Chicago. — Turbo-generators; headlights; floodlights; safety switches; wiring appliances. Represented by William Miller, J. A. Amos, George E. Haas, J. V. Baker and W. A. Ross. Space B.

Railway Purchases and Stores, Chicago.—Magazines. Represented by K. F. Sheeran, J. P. Murphy, Jr., and John R. Moulton. Space 262.

Reliance Machine & Stamping Works, New Orleans, La.—"Spee-D" high pressure grease appliances for locomotive connecting rod lubrication; new "Spee-D" high pressure terminal and station grease guns, types U-8000 and U-6000. Represented by E. B. Norman, George A. Pettit and H. C. Manchester. Spaces 237 and 238.

Ryerson & Son, Inc., Joseph T., Chicago.—Staybolt iron. Space 107.

Simmons-Boardman Publishing Corporation, New York.—Railway Mechanical Engineer and other transportation magazines and books. Represented by L. B. Sherman, R. E. Thayer, H. A. Morrison, H. H. Melville, H. E. McCandless, L. R. Gurley, S. W. Hickey, Roy V. Wright, C. B. Peck, E. L. Woodward and H. C. Wilcox. Spaces 228, 229 and 230.

Sinkler, Inc., Joseph, Chicago.—Locomotive packing; master valve repair sets; electrode holders. Represented by Joseph Sinkler. Space 47.

Standard Brake Shoe & Foundry Company, Chicago.—Locomotive spring bands; brake shoes; iron and steel castings. Represented by C. K. Elliott, A. A. Walker and Earle A. Mann. Space 261.

Standard Car Truck Company, Chicago.—Barber stabilized trucks; Barber lateral motion device; Barber roller side bearings. Represented by F. L. Barber, R. E. Frame, F. D. Barber, E. W. Webb and J. B. Edgerton. Spaces 171 and 172.

Standard Stoker Company, Inc., The, Chicago.—Working model of type H-T stoker; working model of type D-A slope sheet coal pusher; models of front or locomotive units of LT-1 Conversion, and Standard modified type B and B-K stokers; improved parts of stokers. Represented by F. P. Roesch, W. L. Lentz, Henry S. Mann, A. L. Whipple, C. T. Hansen, L. F. Sweeney, C. A. Binney, E. H. Parr, H. N. Carmer, W. P. Chenault, H. W. Cook, G. A. Edwards and Clarence Welker. Spaces 131 and 132.

Sunbeam Electric Manufacturing Company, Evansville, Ind.—Locomotive headlights and turbo-generators. Represented by J. Henry Schroeder, C. E. Kinnaw and W. E. Richard. Spaces 151, 152, 161 and 162.

Superheater Company, The, New York.—Type "E" superheater unit; exhaust steam injector; centrifugal pump; American multiple-valve throttle; Tangential steam dryer; C. F. feedwater heater pump; coil and tube type feedwater heaters. Represented by G. L. Bourne, F. A. Schaff, R. M. Ostermann, H. B. Oatley, Bard Browne, C. A. Brandt, N. T. McKee, B. C. Wilkerson, E. J. Drewyour, C. H. David, F. Smith, S. Macdonald, E. A. Averill, P. D. Blanchard, B. G. Lynch, W. G. Tawse, G. Dolan, I. F. Sharp, T. McGinnis, L. Bryan, G. Fogg and R. J. Van Meter. Spaces 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92 and 93.

Superior Hand Brake Company, Chicago.—Vertical hand brakes; horizontal hand brakes; drop shaft brakes; hand brake chain adjusters. Represented by H. C. Smith and R. C. O'Connor. Spaces 169 and 170.

Superior Railway Products Corporation, Pittsburgh, Pa.—Superior automatic soot blowers; pneumatic steam valve and operating valve. Represented by G. S. Turner, W. O. Martin, B. H. Lobdell and W. E. Larson. Spaces 25 and 64.

Swanson Company, The, Chicago.—S-CO automatic flange oiler. Represented by O. W. Swanson. Space 9.

Symington-Gould Corporation, The, New York.—Journal boxes; lids; dust-guards; truck spring snubber. Represented by D. L. Townsend and H. T. Casey. Spaces 68 and 69.

Timken Roller Bearing Company, The, Canton, Ohio.—Timken roller bearings for driving axles, engine trucks and trailer trucks of steam, electric and Diesel locomotives, tenders, cars and high-speed trains; Timken bearing to be used under new Pullman cars assigned to the "Broadway Limited" and the "Twentieth Century Limited"; Timken high dynamic steel locomotive main and side rods and reciprocating parts of light-weight design; Timken crank pin bearings and models of railway applications; X-ray photographs. Represented by W. C. Sanders, T. V. Buckwalter, M. S. Downes, J. A. Morland, H. L. Hexamer, R. B. Lewis, M. H. Hykes, C. F. Crowell, R. J. Daniels, P. C. Paterson, C. L. Eastburg and R. M. Ross. Spaces 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23.

T-Z Railway Equipment Company, Chicago.—Locomotive and car devices. Represented by G. S. Turner, J. S. Lemley, F. J. Kearney and F. B. Platt. Spaces 24 and 65.

Ulster Iron Works, Dover, N. J.—Hand-puddled wrought iron, staybolt and engine bolt quality. Represented by C. F. Barton, John H. Craigie, E. W. Kavanagh, N. S. Thulin and H. T. Bradley. Spaces 251 and 252.

Union Asbestos & Rubber Company, Chicago.—Wovenstone pipe covering; Insutape; locomotive packings. Represented by J. H. Kuhns, W. R. Gillies, O. J. Rudolph, G. L. Green and R. M. Covert. Spaces 173, 174, 175 and 176.

Unitcast Corporation, Toledo, Ohio.—Brake balancer; drop end locks; cast steel hopper frames; Unitcast underframe. Represented by George B. Christian, C. M. Hannaford, Cyrus Hankins, Earl H. Fisher and Harvey Russell. Spaces 243, 244, 245 and 246.

United States Metallic Packing Company, Philadelphia, Pa.—King model 36 air compressor lubricator; metallic packing for locomotive piston rods, valve stems and air compressors; locomotive sander; Red Top brake cylinder pressure indicator; models 318 and 3114 lubricators for valves, cylinders driving boxes and guides. Represented by J. J. Ekin, Jr., Clyde Hyslop, Harry E. Hyslop, L. B. Miller. Spaces 236 and 253.

Valve Pilot Corporation, New York.—Loco Valve Pilot for indicating and recording speed and cut-off on steam locomotives; Loco Recorder for indicating and recording speed on steam locomotives. Represented by John L. Bacon, C. F. Pennypacker and W. W. Bacon. Spaces 38, 39, 50 and 51.

Vapor Car Heating Company, Inc., Chicago.—Steam generating unit; fin radiation; single tube compensating thermostat; vapor system specialties. Represented by E. A. Russell, J. Van Vulpen, P. B. Parks and William Smith. Spaces, 43, 44, 45 and 46.

Viloco Railway Equipment Company, Chicago.—Sanders; sander operating valves; bell ringers; bell ringer throttle valves; Whelan by-pass valves; automatic rail washers; pneumatic whistle operators. Represented by A. G. Hollingshead, J. F. Raps and C. W. Ploen. Spaces 57, 58 and 59.

Waugh Equipment Company, New York.—Firebar grates. Represented by Robert Watson and Roy C. Munro. Spaces 5 and 6.

Westinghouse Air Brake Company, Wilmerding, Pa.—Miscellaneous air brake devices. Represented by S. G. Down, C. D. Stewart, J. B. Wright, C. D. Foltz and C. C. Farmer. Spaces 115, 116 and 117.

Wilson Engineering Corporation, Chicago.—Diagrammatic transparency of locomotive feedwater heater; model exhibit board of locomotive blow-off equipment; centrifugal blow-off separators; sludge removers. Represented by J. J. Clifford, J. M. Lammedee, H. J. McGrath, C. E. Murphy, J. Welsh and L. F. Wilson. Spaces 129 and 130.

Wine Railway Appliance Company, The, Toledo, Ohio.—See Unitcast Corporation.

Woods & Company, Edwin S., Chicago.—Freight car, passenger car and locomotive tender truck roller bearings. Represented by Knowles Pittman and C. S. Shilling. Spaces 159 and 160.

Yale & Towne Manufacturing Company, The, Philadelphia and Stamford Divisions, Philadelphia, Pa., and Stamford, Conn.—Hoisting equipment; railway switch and pad locks. Represented by R. J. Arehart and W. C. Bigelow. Space 70.

Fuel and Traveling Engineers

(Continued from page 388)

and forceful in his actions and manner of speech. He makes friends easily and holds them. A sidelight on his personality is afforded by an incident which took place when he was leading a class in the fuel instruction car, soon after his appointment to that position. A fireman challenged a statement which he made, with the assertion that what he claimed in connection with a hand-fired locomotive was impossible. Mr. Clark immediately

dismissed the class, asked the fireman when he would go out on his run, put on his overalls and said, "I'm going out with you, and if I am unable to demonstrate the truth of what I have been teaching I am through as instructor."

Secretary-Treasurer Smith

Thomas Duff Smith, more familiarly known as T. Duff Smith, is secretary-treasurer of the association. He was born in Essex, England, October 2, 1868, and after attending the British public schools, was employed on the London Corn Exchange from 1884 to 1906. He came to Canada in February, 1906, taking a position as fuel clerk on the Canadian Pacific at Winnipeg, Man. He was promoted to chief fuel clerk, November, 1908, remaining in that position until May, 1911, when he went with the Grand Trunk Pacific at Winnipeg, as fuel agent. In April, 1922, he was made lake forwarding agent of the Canadian National Railways at Cleveland, Ohio, retiring from railway service December 31, 1931. He joined the International Railway Fuel Association in 1910 and has been on the executive committee of that organization ever since. He was its president in 1912. On May 1, 1932, he became secretary-treasurer of the International Railway Fuel Association, succeeding to the same position in the new organization on the amalgamation of the Fuel and Traveling Engineers associations.

"Duff," as he is familiarly known, is a canny Scotchman and it is largely due to his careful management that the Fuel Association came through the depression in such excellent financial condition, in spite of holding quite extensive technical sessions and publishing annual proceedings each year except 1932. His forceful personality and genius for organization work was never better demonstrated than while he served as a member of the Co-ordination Committee, which succeeded after months of effort in effecting the amalgamation of the International Railway Fuel Association and the Traveling Engineers' Association. Outside of working hours he has plenty to occupy his mind. His avocations include photography, fishing, golf and gardening.

Master Boiler Makers' Association

(*Continued from page 391*)

general boiler department foreman, and has remained in that position until the present time.

He was president of the Capitol District of the New York Central Athletic Association, 1928-1930, and is now vice-president of the Capitol District, New York Central Veterans' Association. He was president of the Albany City Bowling League in 1928-29, and takes a keen interest in base ball and foot ball.

He became a member of the Master Boiler Makers' Association in 1920, was elected to its executive board in 1924, and was chairman of that board in 1926. He was elected secretary of the association in 1931 and in 1936 became its secretary-treasurer. He has fought hard to preserve the association and revive its activities; indeed, it was largely through his efforts that meetings of the association have been held during the past two years. He is easy to approach and not hard to get along with; on the other hand, no one who knows him well would ever accuse him of being a "yes" man. He is foreman of one of the largest boiler shops in the eastern district and has the reputation of knowing how to handle men and get the work out.

Car Department Officers' Association

(*Continued from page 394*)

strength and at a great saving in weight. The Hiawatha trains, which have proved so popular and have demonstrated their earning capacity, were designed and built under his supervision.

The Secretary-Treasurer

Adam Sternberg, formerly master car builder, Belt Railway of Chicago, became secretary of the car department officers' organization in 1924, and since that time until his recent retirement, was one of the most active workers in the organization. He retired from railroad service in June, 1935, and because of removal from Chicago to Cedar Lake, Ind., found it necessary to retire from the secretaryship of the association. Frank Kartheiser, chief clerk to the mechanical assistant to the executive vice-president of the Chicago, Burlington & Quincy, has been appointed acting secretary, pending the election at the convention this month.

General Foremen's Association

(*Continued from page 397*)

trified. It was up to the Kingsland shops to prepare the equipment for operation and to look after its maintenance; the new program was inaugurated smoothly and the work has been carried on most effectively.

Secretary-Treasurer Hall

William Hall, who, because of illness, recently resigned as secretary-treasurer of the association, was one of its charter members. In 1909 he was elected secretary to the executive committee and in 1910 secretary of the association. He continued in this position, the by-laws in 1916 being amended to make the office permanent, rather than elective annually.

Mr. Hall was born in Bromsgrove, Worcestershire, England, July 12, 1856. He was educated in an English church school and at the age of 14 was entered as machinist apprentice on the Midland Railway, now the London, Midland & Scottish, at its Bromsgrove works. He was transferred four years later to the Manchester shops to complete his mechanical education and apprenticeship of seven years. He served as a journeyman machinist at these shops until September, 1881, when, with Mrs. Hall, he decided to emigrate to the United States. He secured a position with the Chicago & North Western, but in 1891 left that company to go with the C. F. Elmes Engineering Works, a marine and jobbing shop. He returned to the Chicago & North Western two and a half years later, and in 1898 was made gang foreman in the main shops at Chicago. He was transferred to Escanaba, Mich., in 1903, and was made general machine shop foreman. In 1913 he was transferred to Winona, Minn., as erecting foreman, remaining there until his retirement in 1923.

While in Chicago he assisted in organizing the Chicago & North Western Mutual Aid Society, serving as its secretary for many years. He was elected a member of the Board of Education of Winona, Minn., in 1915, serving 12 years in that capacity, two as president of the board.

As a charter member of the International Railway

General Foremen's Association, as an indefatigable worker in its interests; and as its secretary-treasurer for many years Mr. Hall has been a prime factor in its upbuilding and success.

Modern Locomotive Equipment-II

(Continued from page 385)

applications incorporated features of both designs 1 and 2, which would give stresses more favorable than those shown in Fig. 10 and Table VI.

Tests of Main-Rod Front Ends

Similar strain-gage tests were also made on the front end of the main rod to determine the stresses in the rod due to both the cylinder pressure and the press fit of the crosshead pin in the rod. The results of these tests are shown in Fig. 11 and Table VII. The stresses in the rod resulting from the 0.004-in. press fit of the crosshead pin were measured first, and are shown by the broken-line curves in the figure. Then a 117,400-lb. pull was applied on the rod, increasing the stresses to the values shown by the full-line curves, which represent the combined stress due to both the press fit and the pull. The pull force on the rod increased the stress by 17 per cent at section N and 36 per cent at section U over that due to the press fit. The variation in stress in going from tension to compressive forces in the rod will therefore be small in actual operation and this is a favorable condition for maximum fatigue strength. The measured stress at section U in the bore is 1.7 times the nominally calculated direct stresses, $P/2A$, and 2.6 times at section N. The measured stresses due to the press fit give reasonable agreement with calculated values based on Lamé's formula in view of the assumptions necessary in making such a comparison.

It is necessary to maintain sufficient press fit of the pin in the rod if it is not to work loose in service. Besides the tests just mentioned additional tests were made on the front end of the main rod. The results of these tests indicate that it is desirable to make the rod eye from 0.002 in. to 0.004 in. tight on the crosshead pin.

Crosshead Test

A comparison illustration of the assemblies constituting the reciprocating parts is shown in Fig. 4 for the lightweight and conventional designs. The usual design of taper-key fit of the piston rod in the cast steel crosshead contributes considerable weight to the reciprocating parts and is not used in the Timken design. In this lightweight design a piston rod having a ¾-in. wall section is keyed by three integral annular grooves on the end of the piston rod to a crosshead consisting of two thick die-forged side plates as shown dissembled in Fig. 12.

Stresses in the piston rod at the base of the annular grooves were determined for two different designs of annular-groove systems and these designs as well as test results for both are shown in Fig. 13 and Table VIII. The bolts were drawn equally tight for the test on each design. The stresses in the bolts were determined by measuring the change in length of each bolt with 0.0001-in. dial gages. Consideration of the factors of magnitude and uniformity of stresses in Table VIII leads to the selection of the second design, which is the one that was adopted for actual service applications with slight modifications. The stresses given are average stresses at the surface of the piston rod based on a gage length of 1⅜ in. and the local stresses adjoining the fillets at the base of the annular grooves would be higher than the stresses shown. These fillet stresses, however, are calculated to be well within the endurance limit of the steel.

For locomotive applications, the system of annular rings is machined to close tolerances, using gages, and then the piston rod is lapped-in to the crosshead body. By this procedure the desired fit and magnitude and distribution of stresses in the crosshead assembly are obtained.

* * *

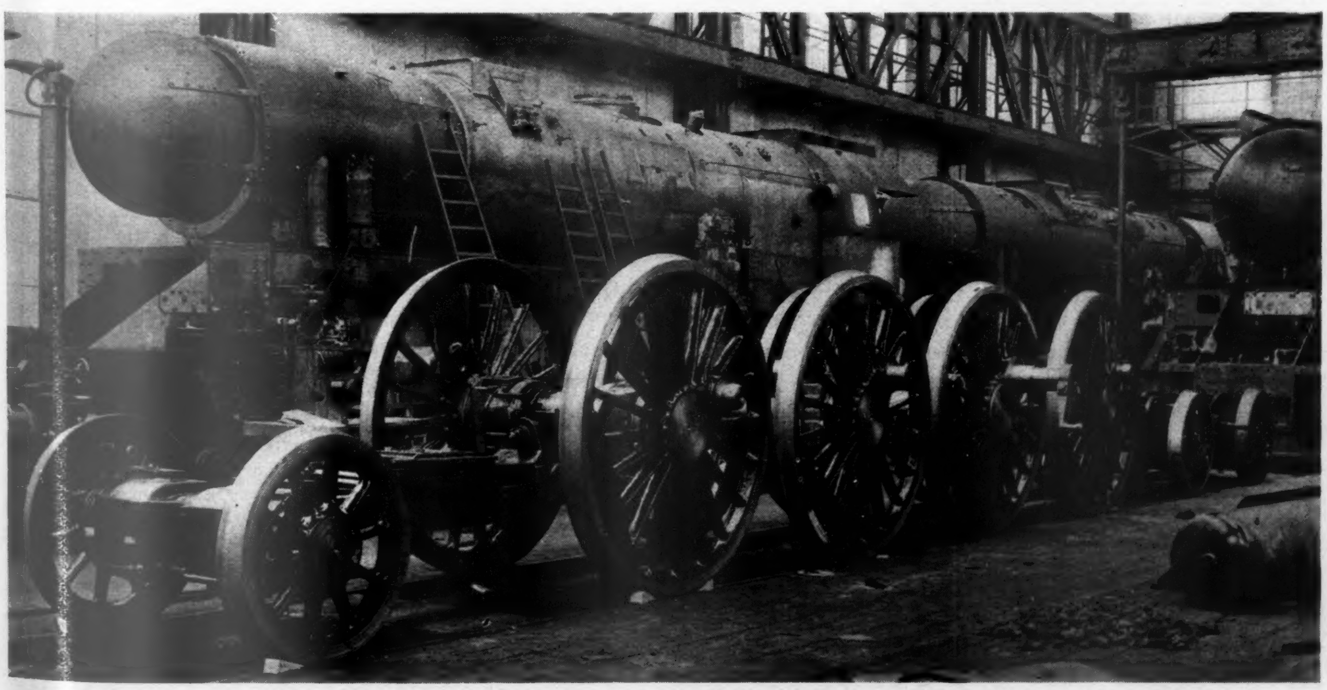


Photo by Underwood and Underwood

Locomotives under construction in the builder's plant at Vienna, Austria

EDITORIALS

New Ideas Change the Character of Shop Work

The methods and facilities now being used by railroad shops in an effort to keep up with the demand for motive power and rolling stock are especially impressive because of the many new things that are coming into use. Railroads have long been criticized because they do not make use of modern ideas but the critics would have a difficult time justifying their statements if they had the privilege of seeing what we see in our every day work. A few instances will serve to illustrate the point. In these days of high-speed train operation, wheels are of greater importance than ever before, and it is not only necessary to turn wheels out of the shops at a faster rate in order to supply the demand, but the quality of workmanship must be better than ever before. This demand has made necessary the installation of many new car and driving-wheel lathes replacing old and worn out machines. These new machines are making it possible to increase production and insure absolutely true and round wheels. In one wheel shop visited recently the production of the shop a year ago was limited by obsolete equipment in the demounting section and the necessity of handling wheels and axles by hand. Within the past six months this section of the shop has been completely re-equipped with new hydraulic demounting presses and wheel and axle-handling equipment that now make it possible to demount 160 pairs of wheels in eight hours without a man handling a single pound of weight.

Air-conditioned passenger cars and the demand for better windows has brought in the double-pane plate-glass windows which, to prevent frosting, must be dehydrated. One road has set up a rather elaborate department in the shop with equipment to do this work which, among other things, involves the use of many vacuum devices and gas dehydrating equipment.

In the passenger-car field there will be observed the increasing use of properly designed exhaust spray hoods for use in painting not only complete cars but many car parts. In steel-freight-car work, the spot system, which has been developed to a high degree on the railroads is being improved every day and among other things of interest is a welding station which, by the use of special pneumatic equipment, clamps the entire car in place while six men weld the body together by means of electric welding equipment.

New machine tools are meeting a demand for increased production and greater accuracy. In four shops $700,000 worth of new machinery has been installed within the last two years. Many of these new machines are equipped with special jigs and fixtures for speeding production and dial gages and micrometers are being used extensively to check the accuracy of operation. Special alloy tool steels are used to decrease cutting time and to increase the number of pieces that may be machined between the grindings of tools.

Taper bolts, that until a few years ago were a hand-made job on a portable engine lathe, are today being selected and ordered by gages and produced on specially equipped turret lathes capable of producing 500 bolts of various sizes each working day.

Rebuilding of worn parts has brought plating and metal-spray equipment into the railroad field. In one case that came to our attention just recently the equipment has paid for itself five times over in a period of less than a year and a half. Electro-plating is being used on many parts such as locomotive main and side rods for protection against corrosion.

Safety is ever important around railroad shops. In several instances on punch-and-shear work the photo-electric cell is used to make it impossible for a man to operate a machine while his hands are in the danger zone.

The use of automotive engines on rail cars, shop trucks and for various other uses has made it necessary to set up complete internal-combustion-engine repair departments with modern dynamometer equipment such as used in the builders' test plants.

One could enumerate dozens of other instances of equipment that was entirely foreign to railroad shops five years ago.

The Way Out of A Difficult Situation

The successful and profitable operation of a railroad is an eternal problem of performing the tasks incident to furnishing transportation within the definite limits of revenues that are fixed by the volume and nature of its traffic. Unlike many more flexible industries it is not possible, when increased expenditures are anticipated, to stimulate sales immediately and sufficiently to provide additional revenue. Therefore railroad management has but two courses open when revenues decrease or expenditures increase—either to lay off men or reduce the cost of operation by improved methods and facilities.

During the past five years the roads have been increasing expenditures for new facilities in the shops and enginehouses, and as a result of actual experience with many of the new units of equipment recently installed are now in possession of cost data that provides positive proof of their money-saving possibilities. Those who are

in everyday contact with the problems of operation know that the opportunities to eliminate the losses due to inefficient methods and obsolete facilities are almost endless.

The railroads are faced with the necessity of adjusting expenditures to meet the new and anticipated wage increases. Is this going to be accomplished alone by reductions in the hours of work performed, with resultant undermaintenance, or has the time arrived for management to take a broad-gaged view of a difficult situation and meet it by initiating a program of shop modernization that will cut the cost of maintaining cars and locomotives. The situation today is one of choosing between a temporary expedient and a constructive program which will produce permanent economies.

Why Not Balance The Car Wheels?

At the Mechanical Division convention last June, L. K. Sillcox, first vice-president, New York Air Brake Company, said that a 1-in. flat spot on a 36-in. passenger-car wheel rotating at a rate equivalent to 100 miles an hour car speed, produces a dynamic effect on the rail approximately twice that of a 2½-in. flat spot on a wheel of the same diameter revolving at a rate equivalent to 60 miles an hour car speed. This fact simply serves to emphasize the vital necessity of giving special attention to rotundity, concentricity, and balance of car wheels used on passenger equipment which is operated in modern ultra-high-speed service. It cannot be questioned that many harmful wheel and rail reactions, due to off-balance conditions, exact their toll in equipment damage and reduced serviceability, even though these reactions may be concealed, to a certain extent, by effective car springs.

Regarding this subject Mr. Sillcox makes the following comment: "Rotative speeds of wheels under railway rolling stock are relatively low, as judged by automotive engine or turbine standards, but the weights involved are, as a rule, much greater. Balancing of railway wheel and axle assemblies has never been practiced by our railways except in the case of locomotive driving wheels where the condition would otherwise be intolerable, due to suspended weights. In England and on the Continent, the actual dynamic balancing of locomotive driving and passenger-car wheels has long been practiced, and is considered essential to the most favorable riding qualities and of true economic advantage. In this country, balancing methods and devices have developed commercially to a higher degree, but research in dynamic balancing has been conducted independently of any railway interest. First developed for small parts and gradually extended in capacity to receive large motor armatures, these balancing machines have as yet found no place in railway shops. Progressively increasing speed will emphasize the necessity for maintaining closer tolerances than those allowed at present. High-speed trains should, no doubt, operate on wheel and axle assemblies which are entirely free from dynamic disturbances. This will combine with associated refinement in truck design and control of truck-car-body reactions to improve materially the riding and tracking characteristics of the equipment. . . ."

A number of railways in this country have found that complaints regarding hard-riding equipment could be remedied by simply turning the car wheels, which were badly out of balance, and that no further change in the truck spring arrangement was required. However, particularly in the case of light-weight high-speed trains, it is now quite common practice to take a light finishing cut over practically the entire car wheel and grind the treads concentric with the journals, thus making sure that the wheels are in accurate balance. In all probability more of this work will have to be done in the future than in the past and it is highly desirable for railway mechanical officers to familiarize themselves with the best methods of balancing car wheels both statically and dynamically.

The New Interstate Commerce Commissioner

With the appointment of John L. Rogers to membership on the Interstate Commerce Commission, succeeding Hugh M. Tate, the Commission now has among its eleven members two who have had practical experience in the mechanical department—Frank McManamy and Mr. Rogers.

There are two schools of thought concerning the requisites of an ideal commissioner. One is that he should be a man of broad experience, of open mind and sound judgment, but not necessarily having had practical experience in railway operation, since the Commission has men of technical training and practical experience on its staff who can be looked to for advice on such matters. There is another school of thought which insists that in addition to a broad understanding of men and affairs and a judicial mind, it is important that a commissioner have some practical experience in the field with which the activities of the Commission are concerned. The Commission has been made up largely of men of legal training; occasionally a practical railroader has been selected, a notable example being that of Edward E. Clark, who was a railroad conductor and became the head of the Brotherhood of Railroad Conductors before he entered public service.

Be that as it may, it must be recognized that more and more has the Commission been forced to consider highly technical problems in connection with railway operation. It seems well, therefore, that some of the commissioners, at least, should have a rather thorough practical and technical knowledge of railway practices, and it would seem fortunate that two of the present

commissioners have had a certain background of mechanical-department experience, since the equipment designed and maintained by that department bulks so large in the problems with which the Commission is concerned.

Frank McManamy entered railway service in the maintenance of way department of the Pennsylvania, and then was employed on various other railroads in the maintenance of way department and as a shop employee, locomotive fireman, locomotive engineman, air brake instructor and engineer of tests. For a time he was manager of the western district for the air brake department of the International Correspondence Schools. In entering the service of the Interstate Commerce Commission as an inspector of safety appliances, February 8, 1908, and as a member of the committee which drafted the present safety appliance standards, his work was quite in line with and a natural development of his previous experiences on the railroads.

In 1911 he was made assistant chief inspector of locomotive boilers of the Interstate Commerce Commission, and was promoted to the chief inspectorship in 1913. In February, 1918, when the railroads were operated under the direction of the United States Railroad Administration, he was made manager of the Locomotive Section, retaining his office with the Interstate Commerce Commission, but resigning from it on July 1, 1918, to become mechanical assistant to the director of the Division of Operation of the United States Railroad Administration, having jurisdiction over the car repair and inspection and test sections, and general charge of matters pertaining to locomotive and car equipment. At the termination of federal control he was made manager of the Department of Equipment, Division of Liquidation Claims, of the Railroad Administration. He returned to the I.C.C. in 1923, serving as its chairman in 1930.

John L. Rogers, like Mr. McManamy, had practical experience on the railroads and is also a career man in the Commission. As a young man and before he attended the University of Tennessee and George Washington University, from the latter of which he received the degree of mechanical engineer, he was employed in the mechanical department of the Southern Railway as a helper in the machine shop and then as an apprentice in the boiler department. He worked in both the Knoxville and Birmingham shops of the Southern. After leaving college he entered the service of the Interstate Commerce Commission in 1917 as a mechanical engineer in the Bureau of Locomotive Inspection. Meanwhile he attended the National University Law School in the evenings and was admitted to the bar. He was made special examiner in the Bureau of Service in 1925, playing an active part in investigations involving refrigeration charges, locomotive equipment and the six-hour day for railroad employees. In 1933 he was appointed executive assistant to Co-ordinator Eastman and later, on the organization of the Bureau of Motor Carriers, was appointed chief of that bureau. While his activities in recent years have not been related directly to mechanical department activities, his early experiences before going to college and later with the Bureau of Locomotive Inspection, have given him a good technical background for dealing with mechanical-department problems that come before the Commission.

Commissioners McManamy and Rogers, with Judge Charles D. Mahaffie, bring the number of career men now on the Commission to three out of a total of eleven; this tendency to increase the number of members on the Commission who have had intimate acquaintance with railroad practices seems quite logical, in light of the increasing number of complicated technical problems which come before that body.

New Books

MODERN RAILWAY WELDING PRACTICE. *By Dipl. Ing. O. Bondy, M. I. Struct. E. Published by The Railway Gazette, 33, Tothill street, Westminster, S. W. 1, London. 128 pages, 8 in. by 5½ in. Price, five shillings net. $3.*

This book on welding practice originated in a series of special articles in English publications—The Railway Engineer and the Railway Gazette—dealing with various branches of railway practice in which welding has proved satisfactory. It is intended to provide concise information on a number of specific fields of application for welding and to assist engineers in the further development of new and important applications. There are eleven chapters in the book, Chapters II, III and IV dealing with the application of welding to rolling stock. Other chapters discuss welding regulations in various countries, with particular reference to those of Germany; welded station roof structures and bridges; welding of rails, etc.

DRILLING AND SURFACING PRACTICE. *By Colvin and Stanley. Published by McGraw-Hill Book Company, New York. 431 pages, 5½ in. by 9 in., cloth bound. Price, $4.*

There are few machine operations which have not undergone changes, many of them significant, since the beginning of the depression. In this treatise on drilling, reaming and tapping, planing and slotting, milling, and broaching, it has been the purpose of the authors to illustrate the most up-to-date practices and to present, in compact form, much information which has not hitherto been available. There are seven chapters in the section on drilling which deal comprehensively with the details of practice for drilling in brass, molded plastics, and wood, as well as in iron and steel. A chapter is devoted to reaming and tapping. There are eight chapters which deal with planers, shapers and slotters in which these various types of machine tools are described and the methods of surfacing with them set forth. Milling and milling cutters are dealt with in twelve chapters and broaching in three.

Gleanings *from the* Editor's Mail

The mails bring many interesting and pertinent comments to the Editor's desk during the course of a month. Here are a few that have strayed in during recent weeks.

Sensibly Applied Hand Brakes

Oh, what a gift it would be to give the man on the firing line a *car built with sensibly applied hand brakes,* and not cars built and then equipped with hand brakes, with no thought given to maintenance. The present application of hand brakes costs the railroads of this country many thousands of dollars and days delay to maintain, due to no thought given this important factor by car designers. Simple arithmetic and application of lessons learned from actual experience can almost eliminate this expense.

Human Relations in Railroading

What we need today is more "lubrication" among our workers and more sympathetic understanding. * * * * I have spent about 32 years in a large railroad shop, most of this time in a position where I have had to study human nature. To do so, I have tried to place myself in the other man's shoes, so to speak, and meet him on his own level. In so doing I have found human nature the same in all men—but each one is tempered differently; psychology, however, works the same on all. In other words, very few men can stand to be driven to anything, but on the other hand there is stored away somewhere in every man's mind a desire to do things, if it can be brought to the surface and put to work. I believe this can only be done by meeting every man on his own level and helping him to understand that he has a place to fill, is endowed with certain inclinations, and that his success in life depends entirely on how well he develops his powers. When I say this I am not talking at random, but from long and intimate experience.

Making the Public Railroad-Minded

The great fairs and expositions which are frequently held in different parts of this country furnish the railroads an excellent opportunity to educate the public to the advantages of railroad travel. Ed Hungerford's "Wings of a Century" at Chicago and Cleveland emphasized in a realistic and dramatic way what the railroads have meant to our country. Unfortunately, too many of our people have had little, if any, experience in traveling on a railroad. What would be your attitude toward railroad travel if you were an adult and had never spent a night on a Pullman car, or even eaten in a diner? Watch the intense interest of people of this sort in looking over a railroad exhibit—the important thing is to get them to see how natural and simple it is to travel in such cars. They are hesitant about tackling something they have never experienced and apparently are just a bit afraid of surrendering themselves into the hands of the porters and dining-car attendants. There is another thing about the attention interest of exhibits. Did you notice at Atlantic City in June, when the great exhibition was thrown open to the public, that the average man, woman or child seemed to be entranced at anything that was moving, no matter whether it was simple or complicated, or whether they understood it or not? With so many expositions taking place, it would seem that the railroads should make a scientific study to determine just what sorts of exhibits will be most instrumental in stimulating a travel interest on the part of the public.

Technological Improvements

Much has been said about unemployment caused by technological improvements. We must not overlook the fact, however, that many of these improvements not only do not displace workers, but actually create employment for large numbers of people. Who, for instance, has lost his job because of the application of air conditioning to railroad passenger trains, and, yet, think of the large number of workers, many of them in relatively high wage and salary brackets, who have had to be added to the payroll to supply the air-conditioning equipment and to operate and maintain it? Or take another striking development on the railroads, which also came out of the heart of the depression—high-speed, streamline trains. Who has lost a job because of the installation of these trains? Surely they have done much to rejuvenate and spruce up the railroads, and just think of the number of people who have been employed in the design, construction, operation and maintenance of this new equipment. Surely the high standards of operation necessitated by its introduction require more and better trained employees throughout the organization; for instance, even the roadbed over which these trains travel has had to be greatly improved.

Light-Weight, Welded Hopper Cars

A subject of increasing interest in the railroad industry today is the construction of light-weight, all-steel, welded cars, a departure from conventional designs in which rivets are extensively used. As applied to freight cars it is the experience of this writer that by careful study of construction principles, using alloy steels and electric welding throughout, a marked reduction in weight can be accomplished without sacrifice of strength.

Confining this discussion to the all-steel hopper car, it is particularly interesting to observe that many such cars of the conventional design, though rated as 50-ton nominal capacity, are not capable of carrying 50 tons of anthracite coal, based on 52 lb. per cu. ft., due to limited cubical capacity, notwithstanding the fact that they are, of course, equipped with 5½-in. by 10-in. axle journals. Indications are that for this commodity the car that will actually carry 50 tons of coal is the one in demand. It is not an uncommon observation to see cars of larger capacity loaded to only two-thirds their capacity and loads divided in cars of even smaller capacity.

Assuming, therefore, that the 50-ton car is popular with the collieries and coal dealers, why should we not concentrate on a coal car of this size, i.e., a car having a revenue load capacity of 50 tons? It does not necessarily follow that the body of such a car must be carried on 5½-in. by 10-in. journals, merely because the A.A.R. rules so provide. It is apparent that we are on the threshold of a new era of car development, and if the cost of light weight steels of proven strength justifies, it is the judgment of your correspondent that we should take advantage of what our engineers and metallurgists offer in this field, and design a hopper car capable of transporting a pay load of 50 tons of anthracite, utilizing trucks having 5-in. by 9-in. axle journals rather than journals of 5½-in. by 10-in. dimensions.

A.A.R. Rule No. 86 sets out a total weight of 136,000 lb. on rail for a car of 80,000 lb. nominal capacity, for which journals of 5-in. by 9-in. dimensions are specified. Assuming that a 50-ton car with 5-in. by 9-in. journals could be constructed of special light weight material, with a tare weight of 36,000 lb. or less, would it be proper and economical to increase the weight by utilizing 5½-in. by 10-in. journals, for which the rule allows a total weight of 169,000 lb. on rail? Obviously if this procedure were followed it would result in a car of undesired capacity—approximately 70 tons—and defeat the objectives sought with light weight steel.

THE READER'S PAGE

What Causes Thermal Checks in Wheel Hubs?

To the Editor:

Thermal checks in wheels have received considerable study because they are recognized as points of potential failure. The research and publicity given this subject pertains to thermal checks located on the wheel tread. Has any study been made of thermal checks in the hub faces of engine-truck wheels? This type of defect has been occurring on the road where the writer is employed and he is anxious to ascertain if this type of thermal check is peculiar to that railroad?

These checks appear on the hub face of the engine-truck wheels of both passenger and freight locomotive engines. They vary in length from 1/64 in. to 4 5/8 in. and always extend radially toward the axle fit; however, they appear around the hub face in fairly well established concentric bands sometimes having a width as much as 4 3/4 in. In some instances, the number of cracks visible to the eye has been half a dozen, but more often there has been several thousand. The small checks of course predominate with only from four to possibly eight or ten having a length of more than an inch.

The concentric bands of radial checks previously mentioned will appear in no predetermined location on any one wheel; however, in most cases they are fairly close to the axle fit, and generally a number of the checks extend all the way to the axle fit. All wheels are scrapped if thermal checks are discovered within 1 in. of the axle fit, or where the length of the longest single check exceeds 2 3/4 in.

Wheels with these thermal checks usually crack while being pressed off the axle. In such cases the fracture will extend through the wheel hub and has extended, in some instances, to the rim of the wheel. In most cases, two fractures, directly opposite one another will occur, and in every case the crack will be through a thermal check.

The writer would like to know if other roads are experiencing similar difficulties from thermal-checked hub faces of engine-truck wheels. What are their causes? Can anyone suggest a remedy?

General Foreman.

Drill Tang Breakage

To the Editor:

Noting in the June *Railway Mechanical Engineer*, page 270, "Drill Tang Breakage," prompts me to send in herewith details that I believe would prove interesting to many of your readers. Having enjoyed many years of experience on drilling and mechanical detailing, I am well aware of the difficulties arising in drilling.

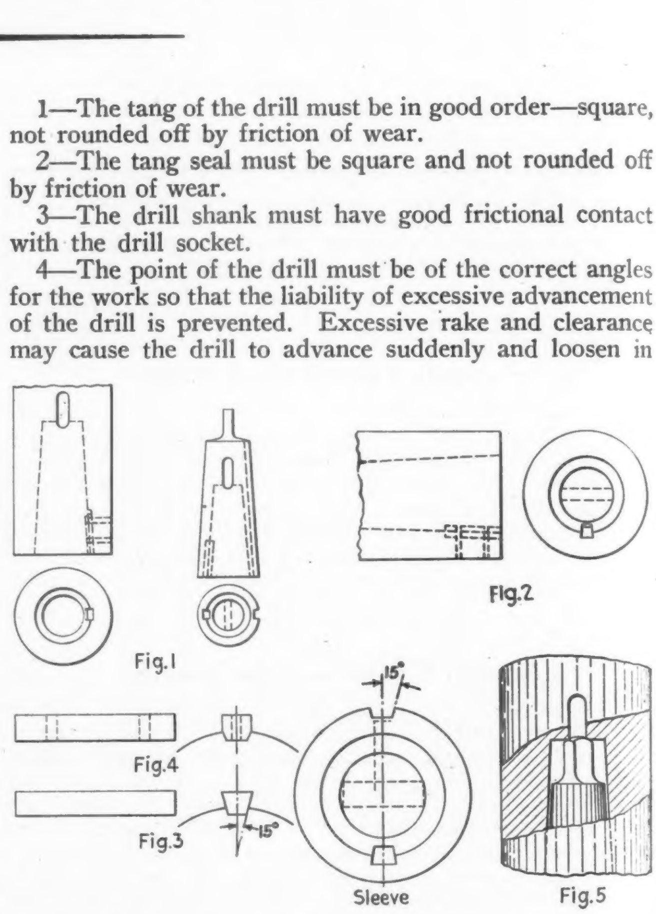
You state there are two precautions that must be observed in preventing drill breakage. My experience shows that the expert drill man notes at least a dozen precautions in successful drilling. Some of these are:

1—The tang of the drill must be in good order—square, not rounded off by friction of wear.

2—The tang seal must be square and not rounded off by friction of wear.

3—The drill shank must have good frictional contact with the drill socket.

4—The point of the drill must be of the correct angles for the work so that the liability of excessive advancement of the drill is prevented. Excessive rake and clearance may cause the drill to advance suddenly and loosen in



the socket; then the spindle rotating over the tang end causes havoc, ruining both spindle and tang. This happens too distressingly often in many shops (Fig. 5).

5—The drill must have proper clearance determined by competent inspectors in the tool crib by the aid of a micrometer.

6—The work must be firmly held.

7—The drill edge should be brought to the work with care.

8—The drilling feed on normal work should be positive. No hand feeding being permitted.

In summing up it has been noted that trouble starts from a lack of exactness in driving the drill home in socket, for innumerably times the operator, in quickly forcing the drill tang to the seat, will cause the edge of the tang to rub slightly or chip the seat of the tang. Thus, both tang seat and drill tang are eventually rounded off, hence, trouble and breakage results (Fig. 5). The proper solution of the problem lies in the reconditioning of all boring-mill and drill-press spindle sockets and sleeves and with the insertion of the key in the socket, necessitating the splining of the socket seat of all drills, sleeves and boring bars (Figs. 1, 2 and 3). The dovetail key, Fig. 3, is of the preferential form. However, the key is often made as Fig. 4, square seating with good fitting and two pins driven in and riveted over. The width of the key is standard at seating of the bores, but the thickness of the key may be less than the width. The side angle of the driving face of the key must be 15 deg.

The procedure herewith illustrated seems a formidable order but the increased efficiency would make the job well worth while in any large shop.

P. Rattek.

With the Car Foremen and Inspectors

Devices for Repairing AB Brake Valves

*By T. H. Birch**

The advent of the Type-AB air brake necessitates developing special tools and devices to facilitate making repairs to AB valves in the most efficient manner. Several devices designed and used for this purpose at the Chicago, Milwaukee, St. Paul & Pacific shops, Milwaukee, Wis., are shown in the illustrations.

In dismantling and assembling accelerator release piston springs the jig, illustrated in Fig 1, proves of great assistance in overcoming the stiffness of the spring. The jig consists of a top plate 3 in. wide by 5½ in. long and drilled with a 1 7/16-in. hole at the center. This plate is secured by nuts to two ⅜-in. rods capable of vertical movement through the bench top and a hardwood block guide, the lower ends of the rods being suitably connected to a foot press and fulcrum underneath the bench. The use of this device enables the accelerator release piston spring to be compressed by operation of the foot treadle and leaves the hands free for dismantling and assembling operations.

The particular merit of the stand and clamp, illustrated in Fig. 2, for holding portions of the AB valve while being repaired is its flexibility and the fact that it can be used for holding firmly the different parts of the valve at whatever elevation is desired, for most convenient operation. This device consists of an angle bracket and clamp welded or riveted to the top of a vertical screw which passes through a nut welded to a base plate which is supported on four pipe nipples at the proper elevation above the top of the work bench. The angle bracket, made of 7/16-in. by 4¾-in. stock, has a horizontal leg 6¾ in. long and a vertical leg 8⅜ in. long. The vertical leg is drilled with a 1 1/16-in. hole, 1⅜ in. above the bottom of the bracket and 1½ in. from one side. The hand clamp which holds the AB valve part firmly in the angle bracket consists simply of a U-shaped piece of steel made of 3/16-in. by 1½-in. stock, drilled at the rounded end of each leg with an 11/16-in. hole for attachment to the brake-valve part and provided with a ⅜-in. valve handle and screw for holding the valve firmly against the vertical leg of the angle bracket.

*Air brake foreman, Chicago, Milwaukee, St. Paul & Pacific, Milwaukee, Wis.

Fig. 1—Foot-operated device for dismantling and assembling AB brake valve accelerator release piston springs

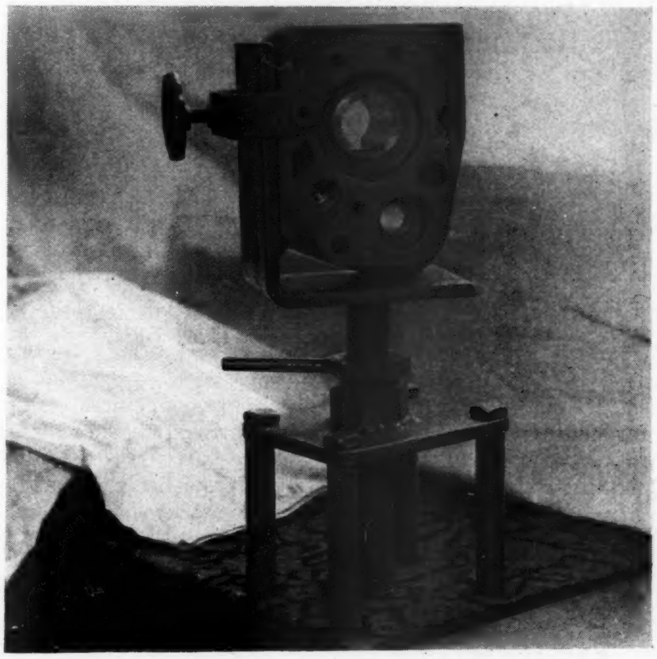


Fig. 2—Stand and clamp for holding AB valve portions while doing repair work

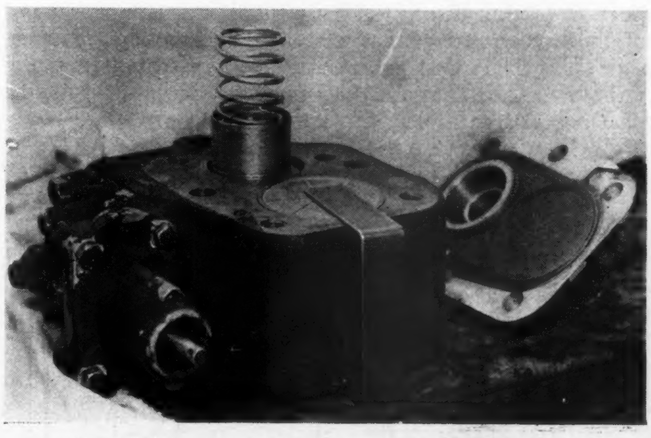


Fig. 3—U-clamp for holding by-pass check valves, springs, seat and stop in place while applying the service-valve cover

The adjusting screw used to vary the height of the angle bracket is 11 in. long and has a 1½-in. standard thread; it is equipped with a lock nut and convenient welded handle which may be tightened to hold the screw at any angular position desired. The base plate to which the 1½-in. standard guide nut is welded is ½ in. by 6 in. by 8 in. and is supported on four ½-in. pipe nipples 6 in. long with ⅝-in. bolts extending through them to hold the fixture rigidly on top of the work bench.

Fig. 4—Device for holding service and emergency pistons while removing or applying the piston-spring nut

In Fig. 3 is shown a very simple but convenient clamp for holding by-pass check valves, springs, seat and stop in place while applying the service-valve cover. This clamp is made of 3/32-in. by 1⅛-in. steel, bent to a U-shape with the upper leg (over the valve) 1⅞ in. long and the lower leg (under the valve body) 3⅝ in. long. The base of the U-clamp (shown vertical in the illustration) is 4½ in. long. By the use of this simple clamp an operation otherwise somewhat awkward to perform is easily handled.

An unusually convenient device, used for holding service and emergency pistons while removing or applying the piston-spring nut, is illustrated in Fig. 4. The top portion of this device is designed to suit the piston nut of the accelerator release piston. The method of using this device is clearly shown in the illustration and details of its design and construction are given in the drawing shown in Fig. 5.

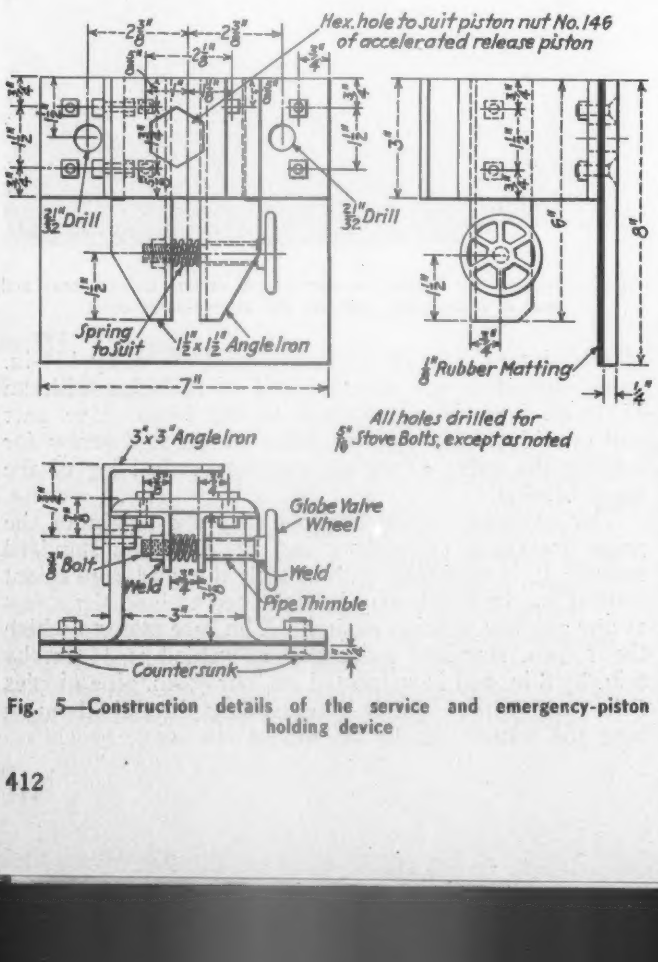


Fig. 5—Construction details of the service and emergency-piston holding device

An efficient device for cleaning the AB valve strainer is illustrated in Fig. 6, which shows details of construction of the device at the left and, at the right, how it looks after application of the strainer ready for testing. The manner of operating this device is as follows: Open the ½-in. cutout cock which permits air to be introduced into the inner cylinder of the strainer reversing the condition that caused the strainer to become clogged. Then open the ¼-in. pet cock which will cause the strainer to revolve at any desired speed by the action of an air jet on three vanes on the holding fixture underneath the strainer. Thus by centrifugal force any dirt loosened by the action of the air in the hub of the strainer will be ejected. If the strainer is in a very dirty condition best results can be obtained by soaking it for a short time in a cleaning fluid.

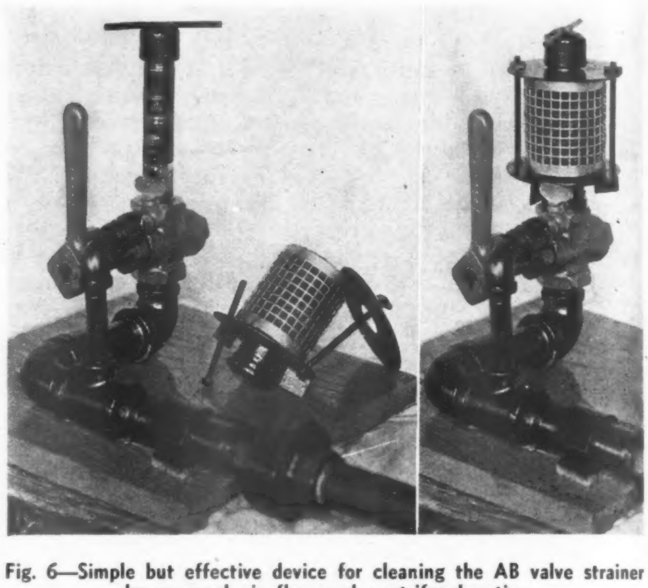


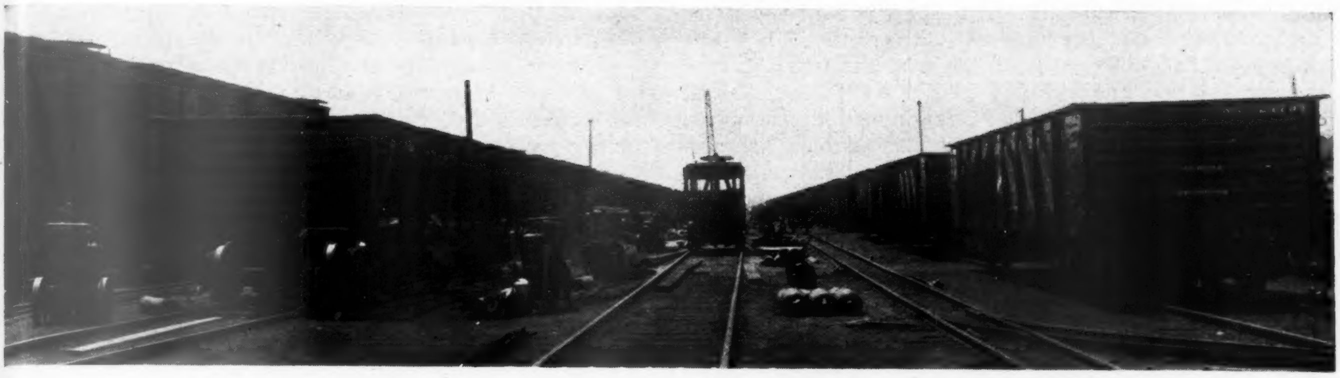
Fig. 6—Simple but effective device for cleaning the AB valve strainer by reversed air flow and centrifugal action

Rebuilding Gondolas At North Proviso

A series of 498 gondolas is now being completely rebuilt and reconstructed at the Chicago & North Western car repair yard, North Proviso, Ill., as shown in the illustrations. These gondolas, built in 1918, were of the composite, drop-bottom type with steel underframes, cast-steel side-frame trucks and a capacity of 100,000 lb. They are being converted to solid-bottom gondolas for coal, sand and gravel loading to meet the demands of shippers on the North Western lines, this type of material now being unloaded almost entirely with drop buckets. The coal formerly shipped in these cars, as equipped with bottom dump doors, is now handled for the most part in large-capacity hopper cars.

As indicated in the first illustration, the work of converting these cars is performed on two tracks with one standard-gage track and one narrow-gage track between for material-handling purposes. A Burro gasoline-engine-driven tractor with a 30-ft. boom is used on the standard-gage track for handling any scrap such as car sills and ends, and a lighter tractor, with necessary trailer equipment is used on the narrow-gage track for the speedy handling of lighter materials.

After a series of 12 of the old gondolas is set on the repair track at the left, the cars are completely dismantled and all corroded metal ends, side sills, bolsters,



Gondolas converted from drop to solid-bottom type at C. & N. W. car repair yard, North Proviso, Ill.

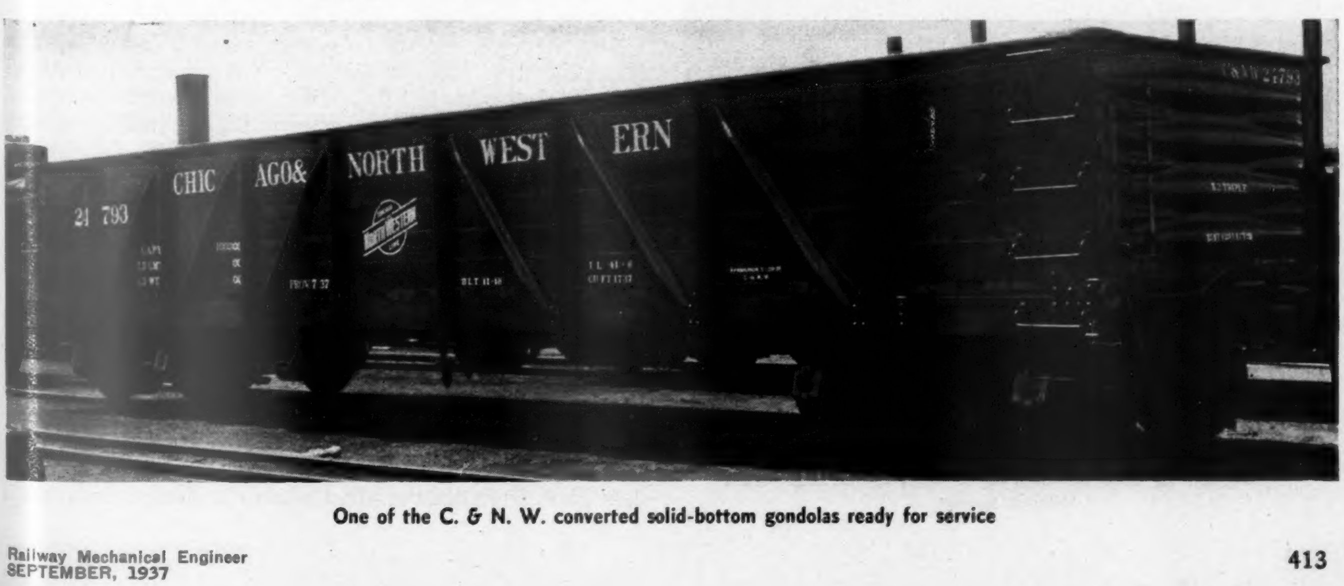
side posts and stakes are cut away with the acetylene torch, this scrap being set for loading on buggies and handled to the end of the yard. The skeleton car frames are then placed on repaired trucks and set on the track at the right for reassembling. Here the new steel parts are riveted in place and all other new material applied. The second illustration shows one of the finished cars which is the equivalent of a new car from a service standpoint and good for another period of use of six or eight years without any except very minor repairs. This conversion job is carried on with a production of three cars a day and a force of 61 men.

In order to handle the steel work in connection with these gondolas cars expeditiously and save as many steel sills, angles, shapes, etc., as possible for re-use in the converted cars, it was necessary to install two flanging presses and suitable furnaces at the North Proviso yard. One of these presses is illustrated. The cast-iron base plate, 3 ft. wide by 9 ft. long, is solidly mounted about 20 in. above the ground level. The corner posts are constructed of 4-in. pipe with suitable bolted tie rods extending through from the base plate to the top of two 15-in. channels which support two air cylinders 16 in. in outside diameter by 24 in. long. These air cylinders are equipped with pistons and piston rods, the lower ends of the latter being attached to a heavy horizontal steel die block which is guided in vertical movement by crossbars between the corner posts. Shop air, supplied at about 85 lb. pressure through the usual three-way operating valves, enables this press to be used effectively in straightening metal side plates, posts, braces and all metal parts which are reused in the construction of the cars.

Efficient furnace and flanging press at North Proviso

At the left of the press and about five ft. away from it is a brick-lined furnace 76-in. long and provided with a counter-weighted door at either end through which the long steel plates are passed and heated preliminary to the straightening operation. The furnace is arranged to burn oil and heat the steel parts sufficiently so that the steel may be straightened with ease. The furnace doors may be readily closed down on the steel so as to cover practically the 14-in. square opening at either end and thus minimize the loss of heat.

Another important labor-saving feature in connection with the use of this furnace and press is the provision, on either end, of four inclined steel rails, 12 ft. long, spaced about 8 ft. apart and mounted on posts 26 in. high at the outer end and 20 in. high at the lower end where roller supports are provided in line with the furnace and press. By the use of this equipment, the long



One of the C. & N. W. converted solid-bottom gondolas ready for service

and somewhat awkward steel shapes which require straightening may be handled with ease. They are simply placed on the inclined ways at the north end of the furnace, are then readily slid down to the rollers, worked through the furnace, straightened in the press and passed through onto similar rollers at the other end, from which they are moved up the inclined rails and subsequently handled by truck and trailer back to the cars where they are reassembled in position. Hammers are little used in connection with straightening steel shapes on this press, which is operated by two men.

Assembling Passenger Truck Springs

The equipment illustrated is used at the Decatur, Ill., shops of the Wabash, for compressing elliptic springs in passenger-car trucks, being patterned after a similar device used at the St. Louis-San Francisco shops, Springfield, Mo. Prior to the installation of this device it was necessary to compress these elliptic springs in a pneumatic press and clamp them together. Then in many cases the springs had to be compressed for removal by placing journal jacks under the spring plank. With the lever arrangement illustrated, connected to a suitable hoist, it is possible to remove and apply truck springs in less than one-half the time formerly required.

Separate operations for the removal or application of springs are not necessary, the entire job being done during the dismantling or assembling of the truck. At the time the springs are removed, for example, the wheels also are removed and the truck placed on dollies. It is then moved from under the stationary hoist and when the repairs are completed to the truck, it is brought back to the hoist where the new wheels are applied and the truck is then reassembled by reversing this operation.

Convenient jig used in removing or applying passenger-truck elliptic springs

All truck springs removed from the passenger cars as they go through the shop are given a bath in No-Ox-Ide in order to lubricate and condition them thoroughly for service. Two men perform this operation, that is, the removal of springs and wheels and assembling of the truck when it has been worked through the shop.

The hoist and spring compressor are located on a track leading directly to the wheel shop which avoids unnecessary handling of wheels in either direction. The device consists of a pair of heavy forged double-arm levers, secured by round fulcrum bars to a riveted steel base plate which rests on the truck frame. Vertical clevis bars extend downward to a rigid horizontal member under the spring plank and are pinned at the top to the lever arms a short distance above the fulcrum. With this construction it is evident that an upyard pull on the crane—in this case a stationary Ingersoll-Rand pneumatic hoist—will have the effect of holding down the truck frame while pulling up the spring plank. This permits disconnecting the spring-plank yoke and when the hoist and lever arms are lowered, the spring plank, elliptic springs, etc., may be readily removed. The reverse operation is followed in reapplying the springs.

Decisions of Arbitration Cases

(The Arbitration Committee of the A.A.R. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

Alteration of Billing Repair Card To Agree with Original Record

On April 29, 1935, at Stockton, Calif., the Western Pacific applied two new 33-in. cast-iron wheels of 80,000 lb. capacity to a Pacific Fruit Express refrigerator car and submitted a billing repair card which showed, due to a clerical error, that the wheels were mounted on an axle with a $6\frac{15}{16}$-in. wheel-seat diameter, ($\frac{7}{16}$ in. in excess of the standard dimension) instead of the correct dimension of $6\frac{5}{16}$ in. The wheel exchange was made because of a car owner's defect and the charge for new wheels, less scrap credit, was included in the repair bill.

The car owner checked the bill and passed it for payment, but returned the billing repair card and wheel statement to the railroad, requesting that the charge for new wheels mounted on the axle with an oversize wheel seat be reduced in accordance with fifth interpretation of A.A.R. Interchange Rule 98. The owner contended that the axle dimensions shown on the billing papers should be carefully checked with authentic documents, according to Supplementary Regulations and Arbitration Decision 1722, prior to rendition of the bill and that the dimensions recorded on the wheel and axle statement cannot be changed to conform to charges made after the bill has been checked and approved for payment by the car owner.

The Western Pacific stated that the wheel record written at the car at the time the wheels were applied showed the wheel-seat diameter as $6\frac{5}{16}$ in. and that this serves the railroad as its original record rather than the carbon copy of the wheel slip attached to the billing repair card. It was pointed out that in writing the billing repair card from this original record a clerical error was

made showing the wheel seat diameter as $6\frac{15}{16}$ in. instead of $6\frac{5}{16}$ in. and that the original record was not changed to conform with the billing. The Western Pacific maintained where no change in the original record is involved, the billing repair card may be corrected after the bill has been rendered.

In rendering a decision, the Arbitration Committee stated: "Decisions 1202 and 1452 are parallel, as the change in axle dimensions made on billing repair card after the bill had been rendered, was due to a clerical error in transcribing from original record taken at the car to the billing repair card. Decision 1722 does not apply, as that case involved a difference between dimensions shown on the original record taken at the car and wheel-shop records. The contention of the Western Pacific is sustained."—*Case 1749, Pacific Fruit Express versus Western Pacific.*

Alloy-Steel Gas-Welding Rod

The Air Reduction Sales Company, New York, has developed a gas-welding rod designed to meet the demand for increased ductility and general improvement in quality of both single and multi-layer steel welds. A feature of the Airco No. 1 high-ductility alloy-steel rod, as it is designated, is its ability to withstand considerable heating without burning. It is reported that tests have shown it to be ideal for all steel pipe and plate welding, both light and heavy.

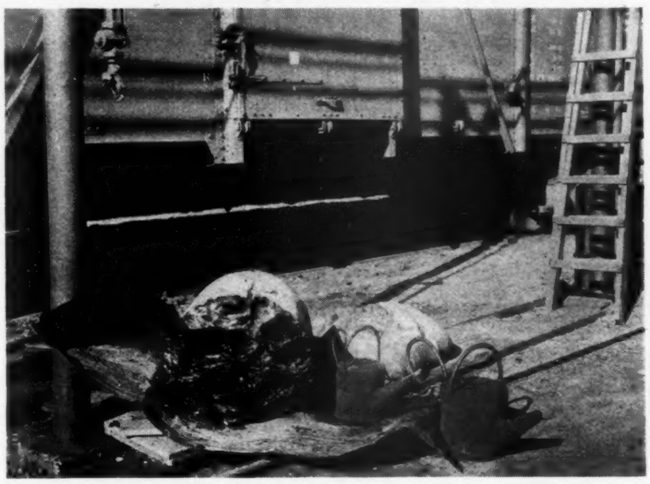
Following are some of the reported physical characteristics of welds made with this rod: Free bend ductilities of single-layer welds range from 20 per cent to 30 per cent depending upon the composition of the steel; free bend ductilities of multi-layer welds are as high as 40 per cent on low- and medium-carbon steels; the welds have ultimate tensile strengths in excess of 60,000 lb. per sq. in.; the specific gravity of welds range from 7.80 to 7.86; Charpy impact values on keyhole notched specimens at 70 deg. F., range from 15 to 30 ft.-lb.; and Rockwell hardness of the weld metal ranges from B60 to B85, depending on carbon content of the base metal and the type of weld.

Making Box-Car Floors Tight

Box car floors which have been in service for some time frequently develop slight cracks due to shrinkage or other cause, thus making the cars unfit for loading bulk commodities such as grain, cement, etc. To permit tightening the floors without the renewal of floor boards, either in part or in full, the equipment and method shown in the illustrations is now being successfully used by the Minneapolis, St. Paul, & Sault Ste. Marie at its main car-repair shops, Minneapolis, Minn.

The method consists simply of cleaning out the cracks with a narrow steel hook, sweeping the floor clean and filling all cracks with a hot waterproofing, or sealing compound which, when cool, makes the floor tight and suitable for any lading. In case the cracks are fairly large, nailing strips are applied underneath the car floor to hold the water-proofing compound until it has had a chance to solidify. Shavings are applied in some of the larger cracks to avoid using an excessive amount of compound. Fine shavings are also sprinkled over the compound while the latter is still hot, thus becoming imbedded in it and giving the cracks a more uniform appearance with the rest of the car floor.

The particular compound used in these cars is black in color, odorless and sets quickly. It is known as Group 12 car water-proofing compound. It is received in 400-lb. metal drums which are cut away so that the



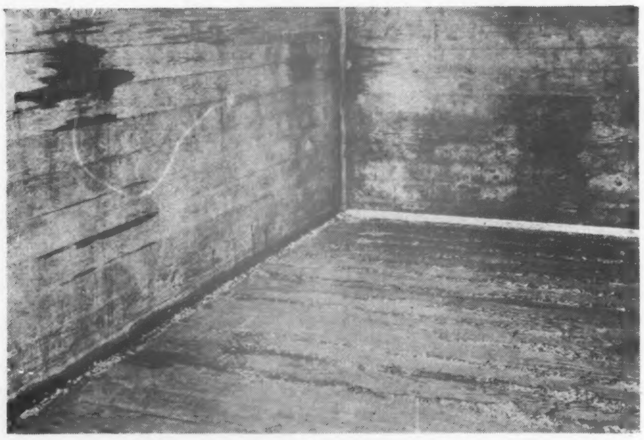
Water-proofing compound as received in 400-lb. metal drums

compound may be readily broken into small pieces and placed in heating pots in a shop-made heater shown in one of the illustrations. This heater consists of a scrap Pintsch gas reservoir in which three round holes have been cut in the top to accommodate two small and one

Scrap Pintsch gas reservoir fitted up with heating pots for keeping the water-proofing compound hot

large heating pots. Scrap wood is burned in this heater, the ends of the heater being covered with a vertical swinging hinged door for use when necessary to regulate the draft. The heater is easily portable and may be placed wherever most convenient for the work in hand.

Referring to the illustration, the compound is heated in the largest pot in the center, the other two smaller pots being used to pour compound into the cracks after they have been cleaned out with a steel hook, as mentioned. The temperature range must be held fairly close as the compound will not pour if too cold and it has a tendency to boil up out of the cracks if poured too hot. In addition to filling cracks in the floor, as shown in another illustration, this compound is used at the junction



One corner of a car in which floor-board and corner cracks have been made tight by use of water-proofing compound

of the floor and the sides and ends, or, in fact, wherever cracks exist. In some cases corner strips are applied and nailed in place while the compound is still hot thus assuring tight joints inaccessible to grain weevils and other insects.

Questions and Answers On the AB Brake

Operation of the Equipment (Continued)

213—*Q.—What change in pressure ensues in the chamber at the left of the accelerated release piston?* A.—Movement of the emergency slide valve to the emergency position cuts off this chamber from the quick-action chambers and establishes connection to the emergency reservoir, which is also the brake cylinder pressure at this time.

214—*Q.—What resultant movement of the accelerated release piston ensues, and why?* A.—The piston is moved to the right, due to the fact that the quick-action chamber air pressure on the right is reduced to zero and the emergency reservoir pressure is on the left.

215—*Q.—What is the rate of the exhaust of the quick-action chamber air to the atmosphere and what happens when the pressure is reduced to a certain value?* A.—It is such that the vent valve will remain open about 60 or 70 sec. When the pressure is reduced to the required value, the vent valve spring forces the valve to its seat.

216—*Q.—What is the purpose of this arrangement?* A.—First, to insure transmission of quick action; second, to prevent the release of an emergency brake application before the train is at rest; and third, to insure that the brake-pipe pressure can be restored when this is so desired.

217—*Q.—When the brake-pipe pressure is restored on the face of the emergency piston following an emergency application, does the piston return to the release position?* A.—No.

218—*Q.—What is the reason?* A.—As previously explained, the accelerated release piston was moved to the right during the preceding emergency application.

219—*Q.—What is the result of this movement?* A.—The emergency spring guide comes in contact with the accelerated release piston stem, thereby arresting further movement of the emergency piston.

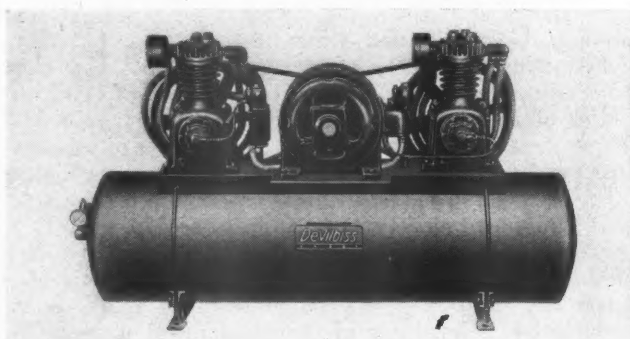
220—*Q.—How long does this condition exist?* A.—Until approximately 20 lb. pressure has been built up on the face of the emergency piston.

221—*Q.—How does this amount of pressure bring about a change in the position of the parts?* A.—This pressure is sufficient to compress the accelerated release piston springs, with the result that the emergency piston and the slide valve start to move toward the release position.

Small Air Compressor For Shops and Terminals

The DeVilbiss Company, Toledo, Ohio, has added to its line of products four small air-compressors with either 7½- or 10-hp. motors and with single- or two-stage compressors available with either horsepower. These compressors are designed especially for use where compressed-air requirements are unusually heavy, and for small shops and terminal plants where compressed-air needs are beyond the capacity of the ordinary air-cooled compressor but not equal to the capacity of the industrial-type water-cooled compressor.

The unit includes two compressors, each developing a maximum pressure of 200 lb. per sq. in., with the two-stage compressors, or 150 lb. per sq. in. with the single-stage compressor, mounted on opposite ends of a 20-in. by 60-in. air tank. The motor driving both compressors



This DeVilbiss 10-hp. air compressor mounted on a 20-in. by 72-in. tank has a displacement of 37½ to 57 cu. ft. of free air per min.

is set between them on the air tank. Each compressor has a V-belt drive, combination air strainer and muffler, check valve, inter-cooler and after-cooler, and a centrifugal pressure-release mechanism set to cut in at 160 lb. and to cut out at 200 lb. on the two-stage unit; on the single-stage compressor the mechanism cuts in at 80 lb. and cuts out at 100 lb. The air displacement of the units varies from 31½ to 57 cu. ft. of free air per min., depending upon pressure and horsepower. The air-tank capacity of both 7½- and 10-hp. units is 10.88 cu. ft., although a 20-in. by 72-in. tank with an air capacity of 13.06 cu. ft. is available. Standard equipment on all units includes a pressure gage, outlet, drain and safety valves, and an automatic starting device.

Lightweight Inspector's Lantern—A Correction

In a description of the National Carbide NJ-1 inspectors lantern, described on page 375 of the August issue, it was erroneously stated that its weight was 6 lb. The actual weight of this lamp is slightly less than 3 lb.

IN THE BACK SHOP AND ENGINEHOUSE

Machine Gas Cutting In Railroad Shops*

Machine gas cutting, the application of the gas-cutting process to the production of shapes from rolled-steel slabs, plates and rough forgings with torches supported and guided by machines as distinguished from hand-torch cutting, is as universal a tool as a hammer, and as important as a drill press or a lathe in its applications. Although this process is a known quantity, many questions arise as to its uses: What metals can be cut? What effect has gas cutting on the metal? What are the limitations as to thickness? What degree of accuracy can be obtained? Are specially trained operators required? What are the cutting speeds? Can production costs be predetermined and how do they compare with present practice? What will be the quality of the work?

Practically all classes of iron and steel in use in railroad work may be machine gas cut. Most ferrous metals can be flame cut. Steels under 0.30 per cent carbon can be cut cold, or without heat-treatment before or after cutting. Machine gas cutting of these steels is just as well standardized and just as much a matter of course as their shaping by any of the older accepted machining methods. Steels in the higher alloy group can also be cut without difficulty. These steels, however, should be preheated before cutting and annealed afterward. When this procedure is followed, there is no more of a problem than when cutting the lower-carbon steels.

Preheating main rods for gas cutting

Flame cutting has no appreciable effect on the physical and chemical characteristics of the plain low-carbon steels which constitute the bulk of steels used on the railroads. That is why these steels are cut cold and need no heat-treatment, except in the case of large forgings which should be annealed and cut hot because of the strains inherent in them.

Steels over 0.30 per cent carbon tend to have some migration of carbon to the flame-cut surface. When correct practice is followed and these steels are preheated before cutting and annealed afterward, they are just as easy to cut as the lower-carbon steels and can be machined afterward without difficulty. The annealing returns the steel to practically its original state. Extensive researches and tests, both in this country and abroad, have established this fact beyond a doubt.

Bear in mind that where machining or grinding operations are performed after cutting, the comparatively small affected area is completely removed. This points out that there need be no concern about the effect of flame cutting on the metal. All plate and forging thicknesses common to railroads offer no difficulties whatever to the machine gas-cutting process. The oxyacetylene torch readily and smoothly severs sections far beyond the practical range of cutting by mechanical means.

Flame cutting can be relied on for reasonable accuracy. The squareness and clean finish of such cuts, together with the sharp top and bottom edges, compare favorably with rough machining. The degree of accuracy depends largely on the grade and thickness of the material and the intricacy of the shape. Where no subsequent machine finish is required, ordinary steel plate generally may be cut right to the finish line. On the higher-carbon steels and parts which are to be machine finished, only a sufficient tolerance need be left to allow for easy and economical machining. Since tolerance varies with the grade of work to be done; it may be readily compensated for by making due allowance on the drawing template or cam used in cutting the shapes. The kerf, or width of the cut, is taken care of the same as tolerance. The allowance is no more than would be made with other methods.

The question of getting good operators presents no unusual difficulties. Any shop man of average intelligence and ability can learn to operate a flame-cutting

Trimming the back end of a main rod with a gas cutting machine

* Abstract of paper presented by R. F. Helmkamp, machine gas cutting specialist, Air Reduction Sales Company, before the Southern & Southwestern Railway Club, Atlanta, Ga., May 20, 1937.

Cutting locomotive cross equalizers from a steel slab

Machine gas cutting of a stack of 3/32 in. steel plates

machine. Simply follow the instructions furnished with each machine, make the recommended adjustments to suit the thickness to be cut, as given in set-up tables, and the rest is largely automatic. With the proper procedure you get good results, and get them economically.

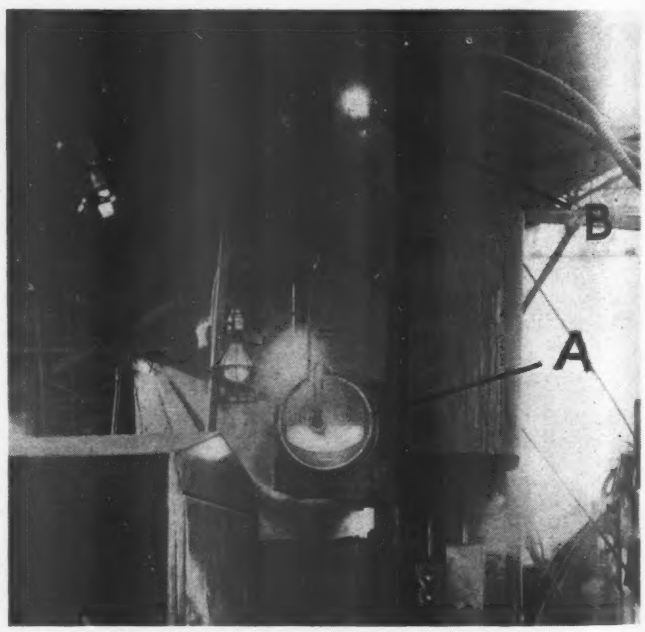
Cutting speeds and gas-consumption costs are items that vary, depending on the kind of steel, thickness, intricacy of the contour, the quality of finish desired, etc. Reliable set-up and gas-consumption tables are furnished, covering steel up to 12 in. thick or more. Reference to these tables provides reliable estimates on gas consumption and cost as well as the actual cutting time. Tip sizes and gas pressures are shown which represent good practice.

The process is not experimental; it has an enviable background in up-to-date industry and especially in the heavy industries. The present stage of dependability and usefulness is the result of earnest effort to put to use a process that has progressed beyond the laboratory stage, and proved its advantages over a period of time.

Accurately Balanced Quartering Machine

Having experienced some difficulty in securing the desired degree of accuracy in turning locomotive journals in the journal-turning and quartering machine at the Northern Pacific locomotive shops, Brainerd, Minn., it developed that the difficulty was primarily due to an unbalanced condition in the machine which was corrected by application of the ingenious special equipment shown in the illustration. The use of this device not only assists the lathe operator in determining when the machine is well balanced and, therefore, capable of doing accurate work, but this condition is made evident by means of an indicating light to the foreman or any one interested who may be passing up or down the shop.

Balancing equipment included on the combination journal-turning and quartering machine, shown in the illustration, consists of one static and two adjustable counterweights, but it is difficult to get an accurate balance on all types and conditions of driving wheels and, if not balanced, the journals are likely to be turned more or less out of round. To remedy this condition, a sensitive ammeter *A* is installed which, within the limited range of power required for turning journals and assuming constant voltage, reflects very accurately the electric power supply to the driving motor. Even minor fluctuations in power input to the motor during each revolution of the driving wheels are, therefore, indicated by the pointer on this ammeter. A small shielded electric light is located just in front of the ammeter dial, part of which is blanked by a segment of dark paper with a narrow vertical slot opening, this paper being pasted on the ammeter cover glass. A photo-electric cell is located behind the ammeter dial in such a way that whenever the



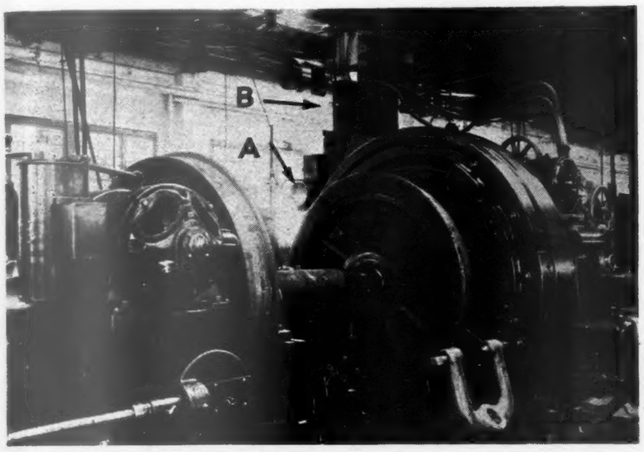
The sensitive ammeter *A*, photo-electric cell and lamp *B* which gives intermittent light when the quartering machine is out of balance

pointer passes the slot and interrupts the ray of light, a second electric light *B* is caused to burn, thus indicating that the current input to the driving motor is fluctuating and that the load is unbalanced. Light *B* is located on one of the shop posts where it may be readily seen.

In using this device, the counterweights on the machine are adjusted until the power input to the motor, as indicated by the ammeter, is practically constant throughout the entire revolution of the driving wheel. When this condition is obtained the pointer is usually located within a limited range on one side or the other of the slotted opening, and the indicating light *B* remains dark. should the pointer happen to cover the slotted opening and remain in that position, light *B* would, of course, burn steadily but not thereby indicate a lack of balance.

If the lathe is not properly balanced in the first place, or if an unbalanced condition develops subsequently, the pointer passes back and forth over the slotted opening and an intermittent light shows at *B*. With lighter work or a smaller cut on the machine, less power is required, in which case the pointer occupies a different position on the dial, but the beam remains interrupted, and light *B* stays dark until such time as lack of machine balance and a fluctuating ammeter pointer cause it to burn again.

The demand for greater accuracy in most departments of locomotive repair work is accentuated by modern high operating speeds, and driving wheels and axles are now receiving more attention than ever before. The method described furnishes an interesting illustration of the ingenious means adopted at one shop to assure accurate machine balance when turning locomotive driving journals and thus eliminate one cause of out-of-round and improperly finished journals.



Locomotive journal-turning and quartering machine equipped to give light indication when out of balance

Safe-Ending Flues by the Electric-Resistance Process

By H. A. Woofter*

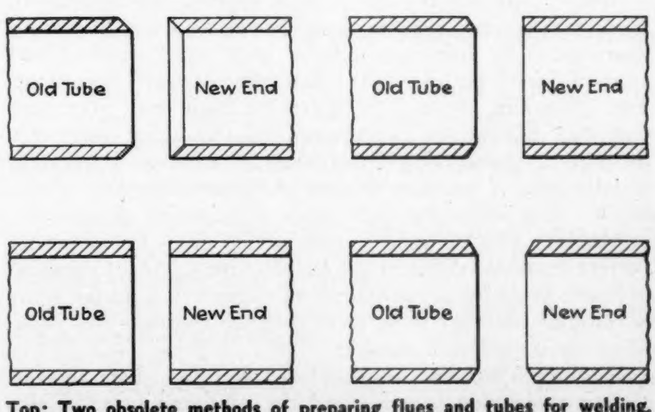
When a locomotive is in service, the flues and tubes oxidize and pit rapidly, especially at or near their junction with the front and rear tube sheets, and it is necessary to remove them occasionally to add safe ends from 8 in. to 12 in. long. This has to be done in some districts as often as every eight months if treated feedwater is not used, while in other sections of the country, where the feedwater is purer, the tubes will last from eighteen months to three years without attention.

Until recent years it was the time-honored custom to heat the ends of the safe end and flue in a gas or oil furnace, swage down the end of the old flue, expand the end of the new piece to be added, then force the new end over the old flue in the manner of a scarf joint and hammer the pieces together in a weld by means of a pneumatic hammer. The rejected or imperfect welds sometimes ran as high as 30 per cent; furthermore, the production was limited to a small number of flues per hour for two men.

In 1912 the Norfolk & Western installed an electric welder for this class of work, followed in a few years by the Nashville, Chattanooga and St. Louis, and a few others. Within the last 12 years more than half of the railroads of the United States and Canada have installed resistance welders in their shops. Users were urged at first to scarf the ends of the flues and safe ends in a lathe before attempting to make electric welds. Also, they were cautioned to machine the pieces very accurately so as to obtain practically perfect contact before attempting to weld. However, this order has changed with the advent of better flue welders and today it is neither necessary to scarf the ends of the flues or safe ends, nor to do any lathe or other machine work, because better clamping devices, dies and more uniform distribution of the current to the work are now available. The flues may be either sawed or cut by an ordinary disc cutter or pipe mill.

The latest type of flue welder burns off about ¼ in. of each piece of the work, so that inequalities of surface are in this way eliminated; however, it is essential to have a properly designed, modern welder. Early flue welders were of the butt type only and required nearly a perfect fit between faces of the work. One of the illustrations shows obsolete and modern methods of preparing flues and safe ends for the welder.

The present practice, or routine, in the most up-to-date railroad shops is about as follows: The old flues and tubes taken from the locomotives are tumbled or rattled for a number of hours inside a revolving drum, where hot water, steam and sometimes certain chemicals are placed to remove rust and scale. The damaged ends are then cut off in a pipe mill or pipe cutter, after which they are ready for new safe ends. If, however, the rattler has not completely removed the scale or rust from the ends, or if they have rusted while in storage, it is well to have a sandpaper belt machine at hand so that they may be pressed against the belt for three or four seconds to clean the end which goes into the electrodes of the welder. The safe ends, ordinarily, do not require cleaning. If, however, they are rusty they also may be cleaned against the sand paper belt. Clean work greatly lengthens the life and eliminates frequent cleaning of the dies. The flue and safe end are then clamped in the welder by means of quick-acting air cylinders. The weld is made in the period of a few seconds by the flash process. The vicinity of the weld is then heated a little more and mechanical pressure applied so as to make a slight upset, or swelling, in the vicinity of the weld so that it will go over a mandrel.



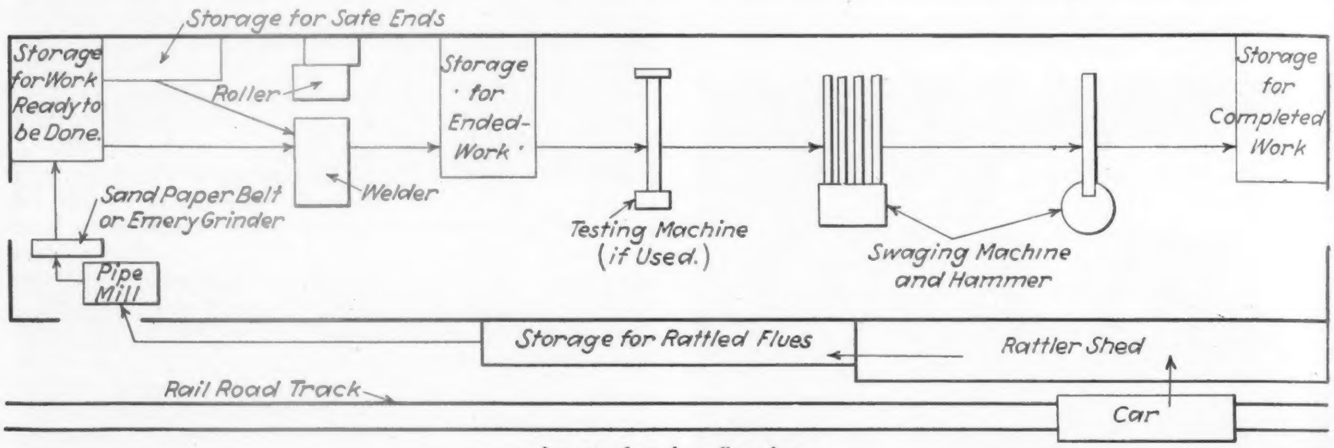
Top: Two obsolete methods of preparing flues and tubes for welding. Bottom: Latest methods of preparing for welding—The sections on the left were sawed or cut in a pipe mill, while the two at the right were parted by a disc cutter

The flue is immediately unclamped and shoved quickly over the mandrel with three revolving rollers, which roll down the upset. An improved method for rolling flues,

* Chief Engineer, Federal Machine and Welder Company, Warren, Ohio.

which eliminates the ridge on the inside diameter caused by rolling in the slag formed during the flash period, was described on page 319 of the July, 1937, issue of the *Railway Mechanical Engineer.*

The practice formerly was to test each weld, either by means of steam or air pressure, at the same time striking the flue several hard blows with a hammer; soap suds were used to indicate leaks. However, a leak was found so rarely that many up-to-date shops no longer test the flues in any manner, but install them directly in the locomotives. Flues are sometimes safe-ended by this method as many as ten or twelve successive times. It is the practice in some cases to reclaim good portions of old flues by welding them together and then add a safe end. A typical layout of a modern flue shop is shown in one of the illustrations.



Layout of modern flue shop

It has been found possible to take care of the flues and tubes of from 1,000 to 1,200 locomotives in one welding machine, by operating it day and night. However, it is better practice to have two welders in an average-sized shop; one of these is usually a small welder of about 60- to 100-kva capacity to weld the flues from 2 in. to 3 in. inclusive, while the other is usually a larger welder of 200-kva capacity for welding superheater tubes. It is possible to take care of all sizes of tubes and flues on one larger welder, but it is necessary to change the copper dies to suit the particular diameter of the work.

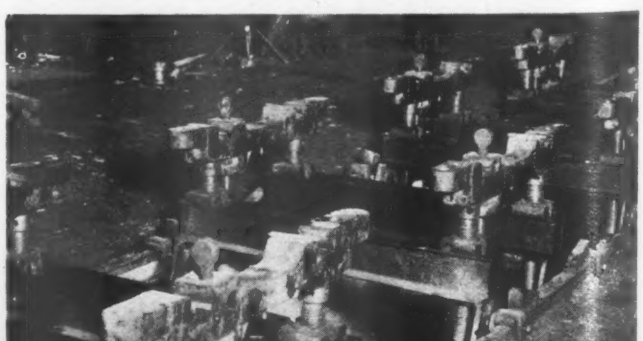
Modern electric-resistance flue welders are absolutely flash proof, thus insuring long life to the windings and bearings. All moving surfaces slide on hardened and ground steel plates, thus assuring perfect alignment. The clamping device is especially improved over any that has previously been available, assuring long life through its protection from slag, as well as a uniform distribution of current around the circumference of the work. The following four types of pressure devices are available: (1) A hand toggle, which gives the operator perfect control of his work at all times; (2) hydraulic pressure from an accumulator or pump; (3) an oil gear, or similar device; and (4) a hand-operated oil jack, which is considered obsolete.

In comparing the total cost of welding flues by the electric-resistance process and the oil-forge process, the author has observed that, with a relatively old-type resistance welder, 700 flues of 2 in. diameter can be welded in 10 hr. at a cost of 1.04 cents per weld, whereas by the oil-forge process only 370 flues of 2 in. diameter can be welded in 10 hr. at a cost of 3.54 cents per weld. In one shop where 80 superheater tubes of 5⅜ in. diameter were being safe ended in a 10-hr. day, it was observed that the cost per weld was 4.92 cents. The author noted with interest while obtaining the foregoing figures that the flues and tubes electrically welded were perfect, but that 30 per cent of the flues welded by the oil-forge process were found defective. While safe ending 2-in., 3-in., 4-in. and 5-⅜ in. flues and tubes with a relatively old electric-resistance welder, the cost of making 1,000 welds at 1 cent per kw.-hr. was approximately $1.25, $1.75, $3.00 and $5.00, respectively. The foregoing costs would undoubtedly be reduced if they were based on welds made by welders of modern design.

About twelve years ago one railroad made up a test flue by welding together ten pieces of boiler flues 2 in. in diameter by 8 in. long. This sample flue was then bent cold around a 20-in. diameter mandrel and subjected to a water-pressure test. There were no leaks, creasing or buckling. This test showed that the welds were at least 100 per cent as strong as the original flue, the pressure and rolling having refined the grain of the metal at and near the weld.

Wheeling Locomotives In 15 Minutes

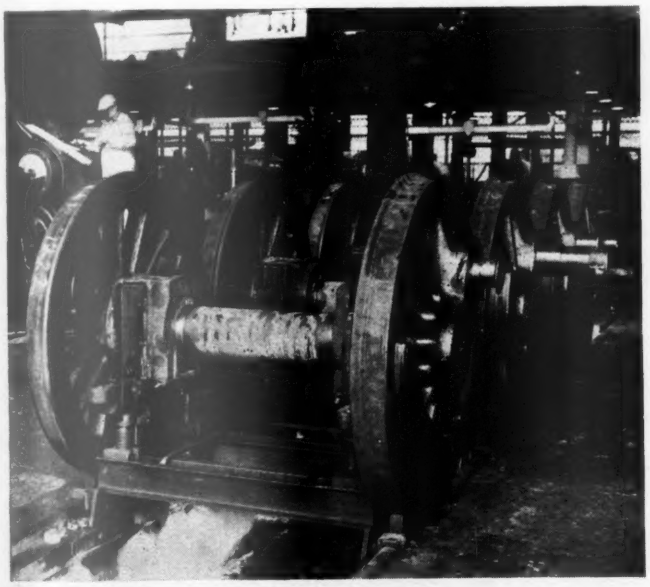
When any statement is made regarding an unusually short time required for wheeling locomotives, the implication to experienced shopmen is that all preparatory



Wheel-positioning V-blocks and binder supports used in the quick wheeling of a steam locomotive

work, in so far as possible, is done in advance, and the concluding operations of tightening binders, setting up wedges, applying brake rigging, etc., are not included in the wheeling time. In other words, the wheeling time is considered to comprise only the interval of time during which the locomotive is lifted by the shop crane from its blocks in the erecting shop and placed on its own wheels over the wheeling pit, with the driving boxes, shoes and wedges in place and the binders applied. On this basis, and using the equipment shown in the illustration, it is possible to wheel a locomotive complete in from 12 to 18 min., and, while the wheel-centering and binder-supporting arrangement are not especially new, the design is unusually simple and rugged, and, therefore, worthy of consideration for use in shops less well equipped.

The equipment required in wheeling a four-coupled locomotive is shown in the largest illustration. The driving-wheel positions and spacings are accurately laid out in advance on the wheeling-pit tracks and the wedge blocks are applied and clamped to the rail as illustrated. Substantial welded steel cross beams, two per pair of wheels are applied across the pit on which are placed heavy 3-in. jacking screws provided to support the binders. These cross beams and binders also are

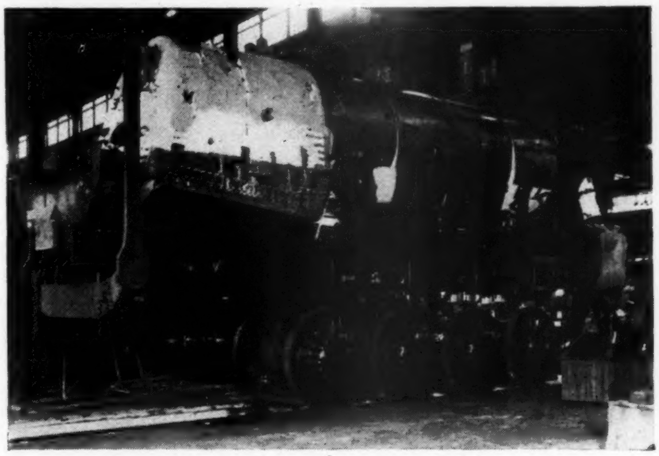


Driving wheels in position over the V-blocks, with binders up against the driving boxes

centered accurately with respect to the driving wheels, so that when the locomotive is lowered over the wheels the pedestal jaws will be accurately positioned over the corresponding slots in the binders. It will be noted from the same illustration that the wedge bolts also are in place.

The next operation in wheeling the locomotive is to set each pair of wheels, with driving boxes in place, in proper position on the wheeling track as determined bv the V-blocks. Care should be exercised to have all crank pins in the same angular position, and, in some instances, it may be advisable to apply the side rods before wheeling. Referring to the second illustration, it will be noted that the jacking screws are set up so as to bring the binders nearly up to the driving boxes, and the wedges are applied in the driving box shoe-and-wedge ways. The shoes are bolted to the frame pedestals and come over with the locomotive in accordance with the usual practice.

A preliminary coating of lubricant is usually applied to the shoes and wedges and, when the locomotive is brought over by the shop crane, as shown in the third illustration, it can usually be dropped without difficulty or loss of time until its weight rests on the driving boxes and wheels. The weight of the locomotive is utilized to force the pedestal jaws into the binders, so



The locomotive being lowered by the shop crane over the accurately positioned driving wheels, boxes and binders

that binder nuts may be easily run up on the bolts and require only a final tightening operation.

Like all well organized shop operations, this method of wheeling a locomotive saves many man-hours of labor. It is much easier to assemble the binders in place before the driving wheels are on the track and it is also easier to apply wedges and wedge bolts before the locomotive is dropped over the wheels. Moreover, with the wheels accurately positioned, it is no longer necessary to move wheels back and forth with a pinch bar, while several men in the wheeling gang are standing idle and waiting. Another important advantage, sometimes overlooked, is that, with a short time required for the actual wheeling operation, the shop cranes are held for only a limited period and quickly released for other important work about the shop.

Locomotive Boiler Questions and Answers

By George M. Davies

This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.

Causes of Scale and Foaming

Q.—Which impurities in water form the scale in a boiler and which cause foaming?—F. C.

A.—The calcium and magnesium bicarbonates and sulphates, and silica are usually classed as scale forming solid present in water. The carbonates will form scale in pipe lines, heaters, pumps, or tanks outside of the boiler, where temperatures are lower than when under the operating pressure of the boiler. Sulphates and silica as well as carbonates form scale in boilers. The sulphates and silica seldom form scale until they

reach the high temperature encountered in the boilers. Oil, or greases, also help to form scale in that they act as binders which cement together particles that might otherwise merely form sludge.

The carbonates will not always form scale but separate out as sludge or mud. However, this sludge or mud is very apt to bake on as scale.

There are three classes of impurities in water that cause foaming, namely certain types of suspended matter, dissolved solids and certain types of organic materials.

Finely divided suspended solids such as silt naturally present in the water or sludge thrown down by treatment and heat in the boiler, tend to cause foaming. The more finely divided or smaller the particles, the greater the effect on foaming.

All dissolved solids in sufficient quantity tend to cause foaming. However, they do not greatly affect foaming characteristics of water unless accompanied by finely divided solids or by organic materials. Very pure water that contains nothing but dissolved inorganic solids usually does not foam easily at concentrations ordinarily carried in boilers.

Certain organic materials such as lubricating oil, etc. greatly affect the foaming characteristics of water especially if there is much finely divided suspended material present.

Advantages of Locating Throttle in Smokebox

Q.—What advantages are gained by locating the throttle in the smokebox instead of in steam dome?—J. G.

A.—With the throttle located in the dome, the steam does not enter the dry pipe until after the throttle is opened, while with the throttle located in the smokebox, the dry pipe, superheater header and units are filled with steam at all times. Also, the available steam space of the boiler is materially increased when the throttle is located in the smokebox. The steam reaches the cylinders quicker than if the throttle were located in the steam dome, thereby making for easier starting and stopping of the locomotive.

The Slope of Crown Sheets

Q.—What amount is the front-to-back slope of crown sheets? —K. F. G.

A.—The slope of the crown sheets from the front to the back of locomotive fireboxes is generally ½ in. in 12 in. The exception would be a switching engine or a locomotive designed for severe grades.

Distance from Bottom Water-Gage Connection to the Crown Sheet

Q.—What is the usual distance from the bottom of the water-gage mounting to the crown sheet?—K. F. G.

A.—This question is answered in Rule 37 of the Interstate Commerce Commission of Locomotive Inspection, Laws, Rules and Instructions for Inspecting and Testing Steam Locomotives and Tenders and Their Appurtenances, which states:

"*Number and location.* Every boiler shall be equipped with at least one water glass and three gage cocks. The lowest gage cock and the lowest reading of the water glass shall be not less than 3 in. above the highest part of the crown sheet. Locomotives which are not now equipped with water glasses shall have them applied on or before July, 1912."

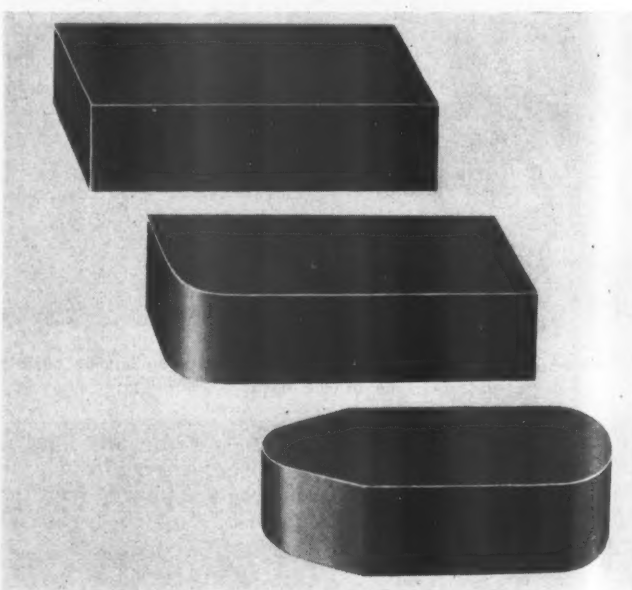
Relative to this question, page 291 of the A. S. M. E. Boiler Construction Code states in part:

"*Water Glasses and Gage Cocks.* Each boiler shall have at least one water gage glass, with connections not less than ½ in. pipe size. The lowest visible part of the water glass shall not be less than 2 in. above the lowest permissible water level. The water gage shall be equipped with a valved drain. The lowest permissible water level shall be that at which there will be no danger of overheating any part of the boiler when it is operated with the water not lower than that level. This level for the usual type of boilers is given in paragraph A-21 of the appendix." Paragraph A-21 of the appendix referred to in this paragraph contains among other information the following two statements relative fusible and steam-actuated plugs:

"Fire-actuated fusible plugs, if used, shall be located at the lowest permissible water level for different types of boilers as given below; steam-actuated plugs, if used, shall be so located that they will operate when the water level is at the point where a fire-actuated fusible plug would be located if installed under these rules."

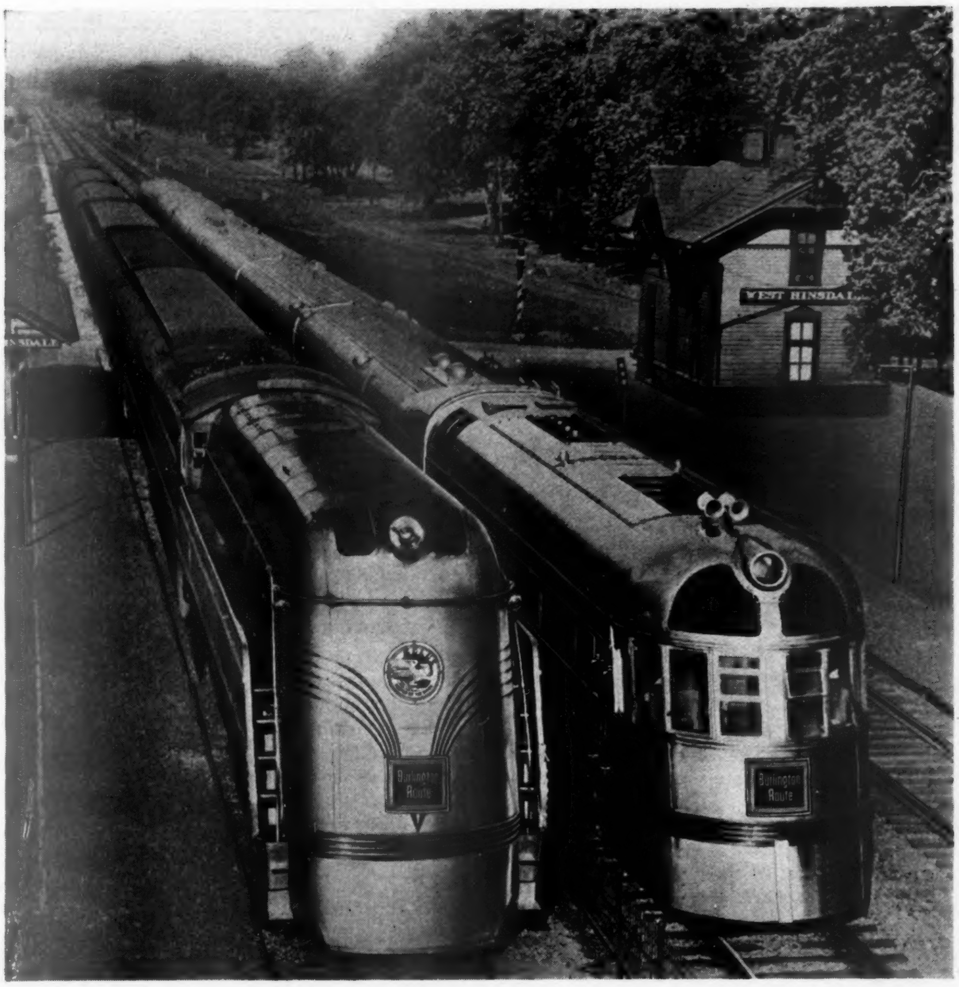
Carboloy Blanks Standardized

Three styles of standard Carboloy blanks available in 96 sizes have been designed for wide application by the Carboloy Company, Inc., Detroit, Mich., based upon experience with thousands of carbide-tool applications. They are adaptable for use on more than 90 per cent of all carbide tools in use today. In many cases, simple revisions in tool design will enable users to use these standard blanks at a substantial saving in carbide cost. These savings will apply to standard blanks used by manufacturers in making their own tools, or used in Carboloy milled-and-brazed, or finished tools.



Three styles of Carboloy blanks available in 96 sizes

A number of advantages are said to result from the use of these Carboloy standard blanks: (1) Savings of 15 per cent and up on the price of Carboloy in any grade effected by quantity production of the tools; (2) large-quantity prices on small quantity orders; (3) immediate deliveries; (4) reduction in designing time and blank cost by using blanks shaped to proved tip proportions; and (5) wide adaptability offers users a chance to group purchases on larger quantities.



Aeolus coal-burning streamlined steam locomotive and conventional equipment, lined up beside one of the Twin City Zephyrs on the Burlington main line between Chicago and Aurora, Ill.

NEWS

A.A.R. Creates Research Division

Establishment by the Association of American Railroads of a Division of Engineering Research to expand and co-ordinate research work now being carried on by the railroads of the country in so far as it affects the physical properties was announced on August 11 by J. J. Pelley, President of the Association.

The Division of Engineering Research will have jurisdiction over all research relating to cars, locomotives, track structures, buildings, electrical, shop and maintenance of way equipment and the materials and supplies used in connection therewith. Not only will it deal with all mechanical facilities, but also with metallurgical and physical problems, as well as fuel, water, paints and other materials and supplies.

This new division will absorb the work now being performed by the Division of Equipment Research which was organized several years ago. L. W. Wallace, who has been head of the Equipment Research Division, has been appointed director of the Division of Engineering Research. G. M. Magee, assistant engineer of the Kansas City Southern, has been appointed assistant director.

The Division of Engineering Research will neither duplicate nor replace the activities of the test or research departments of the various railroads, but will be supplementary and complementary thereto. It will maintain the closest possible contact with the mechanical, civil, electrical, chemical and other technical offices of the railroads, the various divisions of the Association of American Railroads and all manufacturers who supply the railroads with equipment and materials.

Under the plan of organization, the Division of Engineering Research will be aided by two advisory committees. One will be the General Committee of the Mechanical Division of the Department of Operations and Maintenance, or an appropriate committee appointed by them, and will be designated as the Mechanical Research Advisory Committee. The other one will be the Engineering Research Advisory Committee composed of representatives of the Civil, Electrical and Signal Sections of the American Railway Engineering Association and the Engineering Division. In cases where both mechanical and civil engineering problems are involved, the committees will act jointly.

The headquarters of the Division of Engineering Research will be at 59 East Van Buren Street, Chicago, Ill.

L. W. Wallace was born at Webberville, Tex., on August 5, 1881, and graduated from the Agricultural and Mechanical College of Texas in June, 1903. During his summer vacation in 1901, he was a machinist helper in the locomotive repair shops of the International-Great Northern at Palestine, Tex. After leaving college, he served as a special apprentice on the Gulf, Colorado & Santa Fe and in September, 1906, became a member of the faculty in the mechanical engineering department at Purdue University, serving specifically as assistant in railway mechanical engineering. He also spent several

years as professor of railway and industrial management and was in charge of all railway mechanical work.

During his 11 years at Purdue, all of Mr. Wallace's summer vacations, except two, were spent in railroad work. His activities included work in car and locomotive design on the Missouri-Kansas-Texas; locomotive road tests and other experiments in the test department of the Atchison, Topeka & Santa Fe; association with Professor L. E. Endsley in tests for the American Steel Foundries with experimental track, relating to the frictional resistance due to sharp wheel flanges, and in comparative tests of rigid and flexible freight car trucks; preparation of instruction booklets for the Railway Educational Bureau; locomotive road and refrigerator car tests in association with Professor G. A. Young; road and laboratory tests with respect to the behavior of locomotive cinders, in co-operation with the Monon;

L. W. Wallace

and a series of standing tests at Purdue with large New York Central freight locomotives. While at Purdue he continued research on locomotive cinders.

From June, 1917, when he left the university, to March, 1919, he was assistant general manager of the Diamond Chain & Manufacturing Company, Indianapolis, Ind. He left that company to become director of the Red Cross Institute for the Blind at Baltimore, Md., and in January, 1921, became secretary of the American Engineering Council, then known as the Federated American Engineering Societies. He remained in this capacity until 1934, when he became vice-president of the W. S. Lee Engineering Corporation, in charge of its Washington office. In January, 1935, Mr. Wallace was selected as director of the Division of Equipment Research of the A.A.R., which position he held until his recent appointment. Purdue University conferred an honorary degree of Doctor of Engineering upon him in 1932.

G. M. Magee was born at New Hampton, Mo., on January 31, 1905, and was educated at Kansas State Teachers College, Pittsburg, Kan., and the University of Illinois where, in 1927, he completed a course in civil engineering. He entered railway service in 1924 as a chainman on the Kansas City Southern at Pittsburg, and in 1925 was granted a leave of absence to attend the University of Illinois. He returned to the Kansas City Southern in 1927 as a draftsman and subsequently was assigned to a study of the economic weight of rail. In 1931 he became assistant en-

G. M. Magee

gineer and in 1933 made track tests for the Carnegie-Illinois Steel Company and the American GEO Company, both here and in Germany. Upon his return to the Kansas City Southern in 1935 he served successively as chief draftsman and assistant engineer. Mr. Magee is active in the work of the American Railway Engineering Association.

B. & O. Capitol Limited Now Hauled by Diesels

The 773-mile Washington, D. C.-Chicago run of the Baltimore & Ohio's Capitol Limited is now made in both directions with a Diesel-electric locomotive, the road having assigned its first two 3,600-hp. Diesels to that service. This, the B. & O. statement says, is the first time in eastern railroad territory that a long-distance train has been "powered in both directions by Diesel-electric drive." Two more of the 3,600-hp. Diesels will be delivered to the B. & O. within a few months.

Prior to the assignment of both to the Capitol Limited, one of the two Diesels hauled the Royal Blue on its daily round trips between Washington and New York, while the other went out of Washington at the head of the Capitol Limited every other day for the run to Chicago. One of these engines recently made "the longest non-stop run in eastern railroad history"—551.4 miles from Cincinnati, Ohio, to Washington.

Railway Pension Plan

The labor-management compromise agreement on railway pensions recently embodied in law when President Roosevelt signed the Carriers' Taxing Act of 1937, brings about three major changes as compared with the enjoined law whereby the pension plan was split into two acts—one setting up the retirement plan and the other levying taxes to finance that plan. First, the new act sets up a permanent schedule of taxation. Second, there is the change in the tax rates. The new law sets up income taxes on employee earnings up to $300 a month, and an excise tax on carrier payrolls (with amounts paid over $300 a month also exempt) at the following rates: 1937, 1938 and 1939, 2¾ per cent; 1940, 1941 and 1942, 3 per cent; 1943, 1944 and 1945, 3¼ per cent; 1946, 1947 and 1948, 3½ per cent; 1949 and subsequently, 3¾ per cent. Finally, the scope of the tax act has been broadened so as to include, "in the capacity of employers groups . . . railroad associations, bureaus, and other joint agencies and the 21 standard railroad labor organizations."

The original tax act carried employee income and carrier excise tax rates of 3½ per cent. The estimated yield under the new rates is $121,000,000 for the fiscal year 1938, and thereafter increasing amounts up to the 1950 peak when the yield is expected to stabilize at $165,000,000.

President Roosevelt also signed on July 1 the joint resolution which carries for the fiscal year ended June 30, 1938, an appropriation to the railroad retirement account of $99,880,000 plus the account's unexpended balance of about $41,000,000. The Railroad Retirement Board is thus provided with funds for the administration of the pension plan.

I. C. C. Vacancy Filled By John L. Rogers

The appointment of John L. Rogers of Tennessee to succeed Hugh M. Tate on the Interstate Commerce Commission was confirmed by the Senate on August 17. Mr. Rogers, who is 48 years old, came with the commission in 1917 as a mechan-

John L. Rogers

ical engineer in the Bureau of Locomotive Inspection. Since August, 1935, he had been chief of the Bureau of Motor Carriers of the commission.

The nomination of Joseph B. Eastman for a new term was confirmed on July 26. Both terms expire December 31, 1943.

Pullman Depreciation Rates Approved

The Interstate Commerce Commission, Division 4, has approved rates at which the Pullman Company desires to charge off depreciation on its equipment. The rates were submitted in accordance with an order of the commission on May 18 1936, and will apply, if the company so

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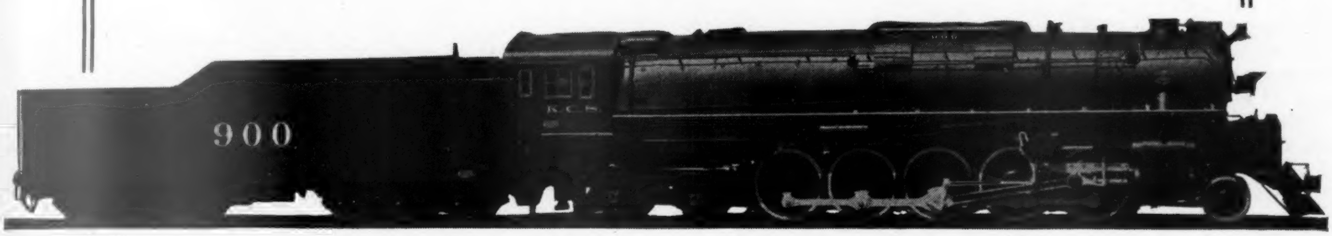
NEW HEAVY POWER
for the
KANSAS CITY SOUTHERN RAILWAY



The first of five heavy 2-10-4 Type oil burning locomotives (5 oil burning, 5 coal burning) recently delivered by Lima to the Kansas City Southern Railway. » » » This power is designed to meet the requirements of high capacity, high speed freight service.

WEIGHTS IN WORKING ORDER, POUNDS				
On Drivers	Eng. Truck	Trailer Truck	Total Engine	Tender Loaded
350,000	50,600	Front 53,200 Rear 55,200	509,000	348,000

WHEEL BASE			TRACTIVE EFFORT
Driving	Engine	Eng. & Tender	93,300
24' 4"	48' 8"	98' 5"	

BOILER		CYLINDERS		DRIVING WHEEL
Diameter	Pressure	Diameter	Stroke	Diameter
92"	310 lb.	27"	34"	70"

LIMA LOCOMOTIVE WORKS, INCORPORATED, LIMA, OHIO

LIMA LOCOMOTIVE WORKS INCORPORATED

desires, from January 1, 1937, until they are further revised by the commission. The component percentage rates of depreciation are as follows:

General office buildings, 9.8 per cent; shops, 2.93 per cent; miscellaneous structures, 3.73 per cent; shop machinery, 3.85 per cent; standard sleeping cars, 3.79 per cent; tourist sleeping cars, 3.94 per cent; parlor cars, 3.86 per cent; composite cars, 3.7 per cent; private cars, 3.58 per cent; dining cars, 3.74 per cent; miscellaneous equipment, 7.02 per cent.

New Construction

The Minneapolis, St. Paul & Sault Ste. Marie has awarded a contract to Ernest M. Ganley & Co., Inc., Minneapolis, Minn., for the construction of an addition to its Shoreham shops enginehouse at Minneapolis, at a cost of about $30,000.

The Wabash has awarded a contract to the Cooper-Little Company, Detroit, Mich., for alteration work on its brick enginehouse at Delray, Mich., consisting of the construction of three new stalls and the extension of two existing stalls. A contract has also been awarded to Longwill-Scott, Inc., St. Louis, Mo., for the installation at Delray of a new 105-ft. three-point bearing turntable and for the removal of the 80-ft. turntable at that point. The latter contract also involves the construction of the concrete pit for the new turntable.

New Equipment Orders and Inquiries Announced Since the Closing of the August Issue

Locomotive Orders

Company	No. of locos.	Type of loco.	Builder
A. T. & S. F.	2*	Diesel-elec.	Baldwin Loco. Works
	3*	Diesel-elec.	American Loco. Co.
	6*	Diesel-elec.	Electro-Motive Corp.
C. R. I. & P.	1	Snow	....
Dominion Steel & Coal Co.	1	0-4-0	Montreal Loco. Works
Elgin, Joliet & Eastern	2	Diesel-elec.	American Loco. Co.
	5	Diesel-elec.	Electro-Motive Corp.
Jones & Laughlin Steel Corp.	1	0-4-0	American Loco. Co.
Minneapolis & St. Louis	2	Snow plows	Russell Snow Plow Co.
Northern Pacific	1	Rotary snow plow	American Loco. Co.
Patapsco & Back Rivers	6	600-hp. Diesel	American Loco. Co.
	2	600-hp. Diesel	Electro-Motive Corp.
Philadelphia, Bethlehem & New England	4	900-hp. Diesel	Electro-Motive Corp.
South Buffalo	6	600-hp. Diesel	American Loco. Co.
Steelton & Highspire	1	600-hp. Diesel	Electro-Motive Corp.
United Fruit Co.	1†	300-hp. Diesel-elec.	American Loco. Co.

Freight-Car Orders

Road	No. of cars	Type of car	Builder
Cambria & Indiana	500	50-ton hopper	Bethlehem Steel Co.
	300	50-ton hopper	Amer. Car & Foundry Co.
Peoria & Pekin Union	25	Hopper	Gen. Amer. Trans. Corp.
	25	50-ton gondola	Pressed Steel Car Co.
Soracabana	500	36-ton (metric) box	Pullman-Std. Car Mfg. Co.
Texas & Pacific	500‡	50-ton box	Pullman-Std. Car Mfg. Co.
	100	50-ton hopper	Bethlehem Steel Co.
Utah Copper	15	30-yd. dump	Austin-West. Rd. Mchy. Co.
	3	Caboose	Pacific Car & Fdry. Co.

Freight-Car Inquiries

Missouri-Illinois	50	50-ton box	....
	25	50-ton gondola	....
Union Pacific	50	50-ton box	....

Passenger-Car Orders

Road	No. of cars	Type of car	Builder
Pennsylvania	1	Diner	Edw. G. Budd Mfg. Co.

* Delivery now being made.
† For service in Panama.
‡ Ordered with an option for 500 additional.

Supply Trade Notes

THOMAS W. DELANTY has resigned as vice-president of the Ajax Hand Brake Company, Chicago.

THE INLAND STEEL COMPANY has moved its St. Paul, Minn., office to new quarters in the First National Bank building.

WAYNE Z. FRIEND has joined the development and research staff of the International Nickel Company, Inc., New York.

THE CHICAGO PNEUMATIC TOOL COMPANY has moved its Buffalo sales and service branch to 128 West Chippewa street, Buffalo, N. Y.

THE CHICAGO PNEUMATIC TOOL COMPANY has moved its sales and service branch at Buffalo, N. Y., to 128 W. Chippewa street.

THE M. D. LARKIN COMPANY, Dayton, Ohio, has been appointed distributor, in the Dayton area, for the General Refractories Company, Philadelphia, Pa.

R. M. NELSON, assistant manager of the Newark works of the American Steel Foundries, has resigned to become chief engineer of the Peerless Equipment Company, Chicago.

THE JOHNS-MANVILLE PRODUCTS CORPORATION, a subsidiary of the Johns-Manville Corporation, New York, has elected three new vice-presidents, as follows: A. R. Fisher, formerly manager of the company's factory at Manville, N. J.; J. P. Kottcamp, manager of the key Mid-Western factory at Waukegan, Ill.; and Alexander Cromwell, manager of the Pacific coast manufacturing operations.

CLARENCE D. HICKS, who has been elected vice-president of the Union Railway Equipment Company, Chicago, with headquarters at St. Louis, Mo., entered railway service as a special agent for the St. Louis Southwestern, from which position he later resigned to enter the employ of the supply department of the Missouri Pacific. Subsequently, he was employed in the mechanical, operating, engineering, traffic and executive departments. During the War, he served with the Federal Railroad Administration at Washington, following which he joined the staff of the federal regional director of the Southwestern region at St. Louis, remaining in that position until the end of federal control. He was then appointed assistant to the president of the Missouri Pacific. In 1928 he became special representative of the president on special duties in Old Mexico with headquarters at Mexico City, D. F. After completing this assignment in 1933, he returned to the United States and engaged in the railway supply business at St. Louis, Mo.

Clarence D. Hicks

MARVIN MARSH, special Armco sales representative of the American Rolling Mill Company, Middletown, Ohio, with headquarters at Kansas City, Mo., has been promoted to manager of the newly created district office in that city.

OWEN C. JONES has been appointed assistant to the president and in charge of sales promotion for the Laminated Shim Company, Inc., Long Island City, N. Y. Mr. Jones has, for the past six years, been associated with the general publicity department of The Linde Air Products, a unit of Union Carbide & Carbon Corporation.

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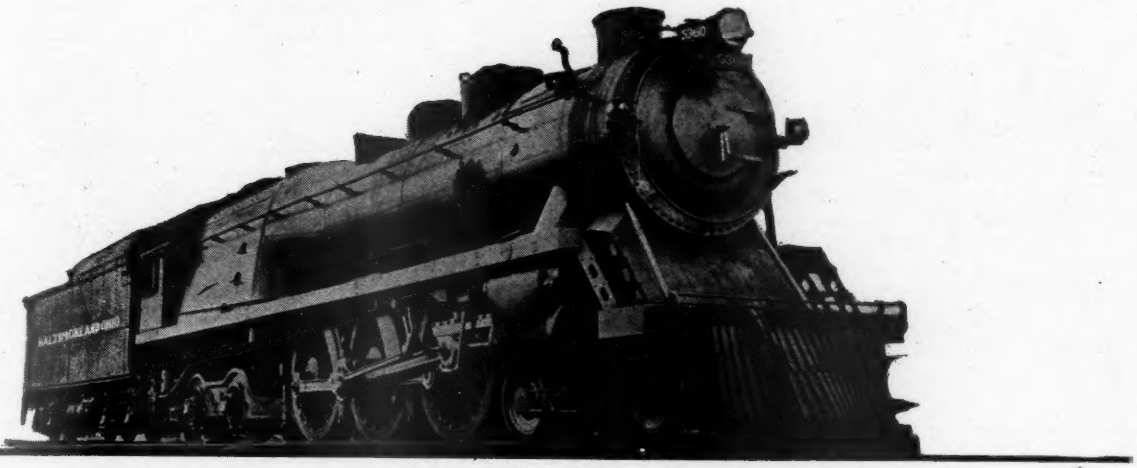

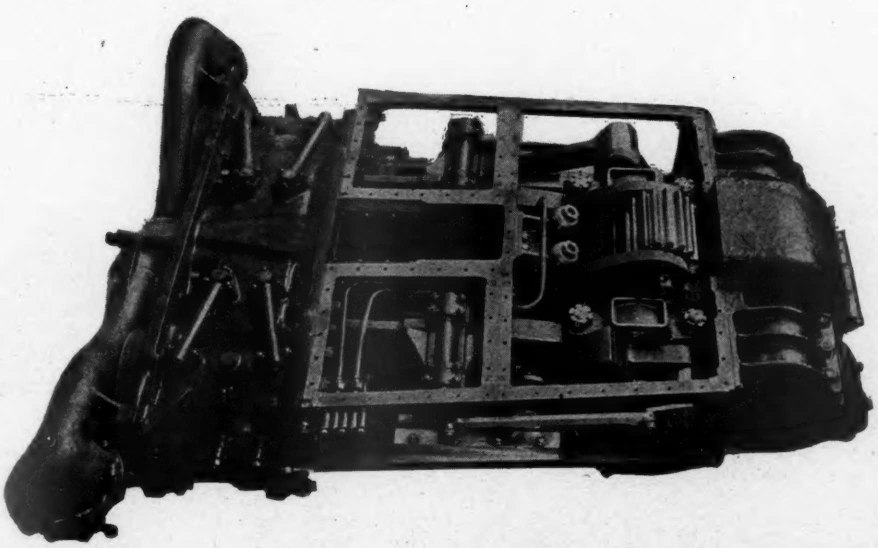

W. H. SCHERER has been appointed manager of the Worthington Pump & Machinery Corporation's plant at Holyoke, Mass. Mr. Scherer previously served for 30 years with the Westinghouse Electric & Manufacturing Company.

R. B. POGUE, assistant chief engineer of the American Brake Shoe & Foundry Company, New York, has been appointed chief engineer; Rosser L. Wilson has been appointed assistant chief engineer, and Wallace B. Sutherland has been appointed assistant to the chief engineer.

J. RYAN, formerly with the Texas Company, and W. Rosser, formerly with the Symington Corporation and later with the Bradford Corporation, have been appointed special sales representatives of Iron & Steel Products, Inc., 657 Railway Exchange, Chicago.

THE UNITED STATES STEEL CORPORATION confirms the sale to the Dominion Steel & Coal Company of its following subsidiaries located in Canada; namely, Canadian Bridge Company, Ltd., Canadian Steel Corporation, Ltd., Canadian Steel Lands, Ltd., and The Essex Terminal Railway Co.

W. A. NEILL has been appointed manager of engineering and sales activities at the Holyoke, Mass., plant of the Worthington Pump & Machinery Corporation, Harrison, N. J. Mr. Neill was formerly manager of the corporation's Air Tool and Portable Compressor division, at Harrison.

E. K. LOFTON, formerly railway sales engineer of the Dayton Rubber Manufacturing Company, Chicago office, has been appointed district sales manager, railway division, with the same headquarters. George S. Anderson has been appointed service inspector to replace field testing and development duties formerly handled by Mr. Lofton.

W. P. WHITE has been appointed district manager in charge of steel and tube sales for the Steel and Tube Division of The Timken Roller Bearing Company in the Eastern and Southern Pennsylvania district, with headquarters at 1208 N. Broad street, Philadelphia, Pa. C. H. Kuthe will assist Mr. White. A. R. Adelberg, district manager in charge of Timken Steel and Tube Division sales in New York, with headquarters at 165 Broadway, will supervise steel and tube sales in the Philadelphia district as well as in the New York area.

S. L. POORMAN, representative of the Westinghouse Air Brake Company in the eastern district, has been appointed assistant eastern manager, with headquarters as formerly at New York City. Mr. Poorman's education was received in the public schools of his home town in eastern Pennsylvania, at Mercersburg Academy, and at the Carnegie Institute of Technology. He entered the employ of the Westinghouse Air Brake Company in 1912 as an apprentice in the test division of the engineering department. Early in 1916 he was assigned to the Atlanta, Ga., office as mechanical expert, and five years later became representative. In 1926 he was assigned to the Washington, D. C., office in the same capacity. Three years later he went to Boston, Mass., as representative and in October, 1930, was transferred to the New York office as representative.

JOSEPH T. RYERSON & SON, INC., Chicago, have just announced a system known as the "Ryerson Certified Steel Plan," which undertakes to select and grade steel by heat to meet narrow specification ranges, to make thorough tests and give the user a report on the analysis, tests, etc. The Ryerson company has been working on the plan for several years, adjusting stocks and ironing out operating problems. The plan, which is of particular value in connection with alloy steels that usually require heat treatment before use, may be summarized as follows: There is available from warehouse stock, alloy steel which has been selected to meet specifications much closer than the standard S.A.E. ranges and is accurately controlled in regard to grain size and other hardening characteristics. All bars except very small diameters are identified by letter symbols stamped on the ends of the bars for purposes of positive identification. Small bars are tagged. All bars have been metallurgically tested and the results of these tests which cover both chemical analysis and heat treatment response are tabulated and transferred to similarly identified data sheets. When a shipment is made to a user, a data sheet for the bars shipped is put in hands in sufficient time so that it can be transferred to the heat treating department before that department is called upon to subject the steel to heat treatment. The plan is designed to simplify the heat treating department's problem because they know exactly what material they have to work with, and also have been informed ahead of time as to how it will respond to heat treatment. It is expected that it will save time and money for users of alloy steel and assure far more uniform results than were previously attained. A booklet describing the plan and its advantages in detail is now being prepared and copies will be sent to steel users including railroads on request.

Obituary

E. V. SHACKLEFORD, vice-president, at St. Paul, Minn., of the Ewald Iron Company, Inc., Louisville, Ky., died on August 12, at his home in White Bear, Minn.

THOMAS HALL JESSOP, for a number of years eastern injector representative of William Sellers & Company, Incorporated, Philadelphia, Pa., died on August 31 at Harrisburg, Pa.

MAX BREITUNG, president and founder of the Alfol Insulation Company, New York, died suddenly on August 19, of a heart attack, while playing tennis at the Gramatan Hotel Courts, Bronxville, N. Y.

G. H. DIETZ, of the Gould Coupler Corporation, with headquarters at New York, died on July 29, after several weeks illness, at his home in Mt. Vernon, N. Y., in his 48th year. Mr. Dietz left the operating department of the New York Central in 1911 to enter the employ of the Gould Coupler Company and was in its sales department at the time of his death.

SAMUEL D. ROSENFELT, who retired on January 1, 1937, as representative for the Franklin Railway Supply Company at St. Louis, Mo., died on August 29.

OLIVER W. LOOMIS, former vice-president of the National Malleable and Steel Castings Company, Cleveland, Ohio, and a director for the past 13 years, died while on vacation August 19, at Ludington, Mich., at the age of 65 years. Mr. Loomis joined the National Malleable in 1891, serving in various capacities until 1919, when he was appointed sales manager. He was first vice-president from 1933 until his retirement in 1936.

FRANK A. BARBEY, who has marketed railway supplies in New England since 1887, died on August 10 at his home in Cambridge, Mass., at the age of 77. After spending the early years of his business life in ship chandlery and foreign trade, with several periods on the west coast of Africa and in South America, he established his own business in Boston in 1887. Mr. Barbey was associated with the development and introduction of many railroad devices. He had been an interested member of various supply associations and railroad clubs, and was a member of the finance committee of the New England Railroad Club at the time of his death.

FRANK H. CLARK, vice-president and a director of the Pilliod Company, in charge of the Chicago office, died suddenly at the Commodore Hotel, New York City, on August 18. Mr. Clark was born at Ballston Spa, N. Y., in 1871, and had been associated with the railway supply business for about 43 years, having entered this field in 1894 with the Standard Coupler Company. In 1912 he organized the Chambers Valve Company, which was acquired by the Bradford Corporation in 1923, and in 1916 the Elvin Mechanical Stoker Company. Mr. Clark later became associated with the Pilliod Company, and since October, 1929, served as vice-president in charge of the Chicago office and a director.

Frank H. Clark

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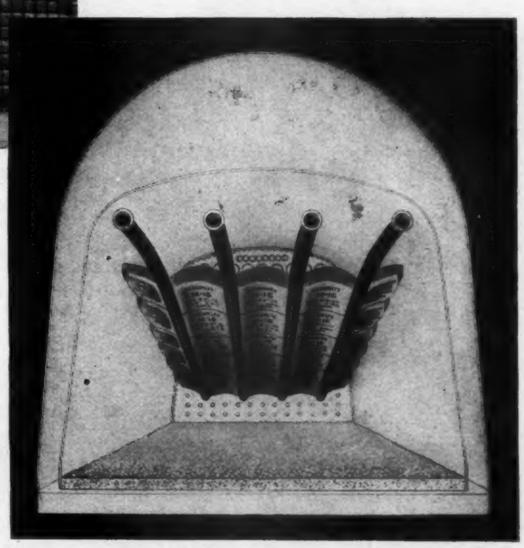
NO. 6 OF A SERIES OF FAMOUS ARCHES OF THE WORLD

ARCH OF TRAJAN, ANCONA

On the majestic arch at Ancona the legible inscriptions that link the names of Trajan and his consort Plotina and his sister Marciana can still be read even though the arch was built A.D. 115. This fine example of Trajanic architecture differs from the Arch of Trajan at Benevento in its narrow proportions, high base and a flight of steps.



The Security Sectional Arch for the locomotive firebox is the fundamental design of all locomotive Brick Arches. Although the Security Arch was first introduced many years ago and the brick arches in modern power are each individual designs, the standard brick sizes and shapes make up the complete arch.

THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

Personal Mention

General

W. R. Hedeman, assistant mechanical engineer of the Baltimore & Ohio, has been appointed assistant to chief motive power and equipment, with headquarters at Baltimore, Md.

A. C. Adams, superintendent of motive power of the Norfolk Southern, has retired, and the position of superintendent of motive power has been abolished.

R. C. Goebel, assistant to the general master mechanic of the Minneapolis & St. Louis at Minneapolis, Minn., has been appointed assistant to the superintendent of motive power. The position of general master mechanic has been abolished.

James H. Wilson, chief mechanical inspector and assistant superintendent of motive power of the Norfolk Southern, has been appointed assistant chief mechanical officer. The positions of chief mechanical inspector and assistant superintendent of motive power have been abolished.

William L. Trout, general master mechanic of the Minneapolis & St. Louis, has been promoted to superintendent of motive power, with jurisdiction over the car department and headquarters at Minneapolis, Minn. Mr. Trout was born at Altoona, Pa. After a public school education in that city he entered railway service with the Pennsylvania on January 3, 1895, serving as an apprentice, machinist and enginehouse foreman at various points

William L. Trout

until October 31, 1913. At that time he left the Pennsylvania to go with the Western Maryland as general foreman in the mechanical department at Cumberland, Md., holding this position until February 28, 1915. On that date he severed his connections with the Western Maryland to go with the Baltimore & Ohio, where he served as general foreman in the locomotive department and acting master mechanic at Philadelphia, Pa. On January 1, 1916, he entered the service of the Long Island (part of the Pennsylvania) as general foreman in the car department at Jamaica, N. Y. From September 1, 1918, to June 30, 1924, he served with the Galena Signal Oil Company as a mechanical expert at Chicago. At the end of this period he entered the service of the Uintah Railway as superintendent of motive power at Atchee, Colo. On June 30, 1925, he resigned to become a special representative in the railway department of the Hulson Grate Company. From September 1, 1926, to December 31, 1932, he was a sales representative for the Gustin-Bacon Manufacturing Co. On February 1, 1935, he entered the service of the Minneapolis & St. Louis as a motive power inspector, being promoted to general master mechanic on March 1, 1935, which position has now been abolished.

Master Mechanics and Road Foremen

John S. Mastin, road foreman of engines of the Pocahontas division of the Norfolk & Western, has retired.

Charles Nesbitt has been appointed master mechanic of the Nevada Northern with headquarters at East Ely, Nev., succeeding E. E. Jarrett, who has retired.

H. C. Wyatt, general foreman of the Norfolk & Western at Columbus, Ohio, has been appointed assistant master mechanic of the Radford and Shenandoah divisions, succeeding F. D. Veazey.

F. D. Veazey, assistant master mechanic of the Radford and Shenandoah divisions of the Norfolk & Western, has been appointed master mechanic of these divisions succeeding R. J. Black.

J. W. McAuley, locomotive foreman of the Canadian National at Prince Rupert, B. C., has been promoted to the position of divisional master mechanic, with headquarters at Prince George, B. C., succeeding A. Watt, retired.

J. E. Friend, division general foreman of the Texas & Pacific, with headquarters at Shreveport, La., has been appointed master mechanic of the Rio Grande division, with headquarters at Big Spring, Tex., to succeed J. N. Blue, deceased.

L. T. Fife, assistant master mechanic of the Southern Pacific, with headquarters at Sparks, Nev., has been appointed master mechanic of the San Joaquin division, with headquarters at Bakersfield, Cal., to succeed J. J. Keller, retired.

F. R. Denney, assistant master mechanic of the Texas & Pacific at Big Spring, Tex., has been appointed master mechanic of the Louisiana division, with headquarters at Shreveport, La., the office of division general foreman having been abolished.

Paul J. Danneberg, who has been appointed master mechanic of the Panhandle and Santa Fe at Slaton, Tex., was born on October 12, 1894, at Kansas City, Kan. He attended grammar and high school and took courses in mechanical drawing, mathematics and English at night school in Kansas City. He entered railway service on May 20, 1909, as a wheel checker on the Atchison, Topeka & Santa Fe. Being under 16, however, he was laid off. On November 8, 1910, he re-entered the employ of the Santa Fe as a machinist apprentice, completing the course on November 29, 1914. He served as a machinist until September 1, 1915, when he became

P. J. Danneberg

assistant enginehouse foreman. On April 18, 1917, he became machinist gang foreman and on May 21, 1918, resigned. Passing examination as a first-class machinist, he was sent to Puget Sound Navy Yard at Bremerton, Wash. Upon his discharge in December, 1918, he became a machinist at the Argentine, Kan., shops of the Santa Fe. On January 18, 1919, he became machinist gang foreman; on September 13, 1920, night enginehouse foreman; on May 25, 1921, day enginehouse foreman; on February 24, 1922, general locomotive foreman. On July 5 of this year he was appointed master mechanic of the Slaton division of the Panhandle and Santa Fe.

Car Department

Millard E. Jones, car foreman of the Norfolk & Western at Lambert Point, Va., has retired.

A. M. McLennan, coach foreman of the Canadian National at Saskatoon, Sask., has been transferred to the position of acting car foreman at Watrous, Sask.

R. Laing, car foreman of the Canadian National at Watrous, Sask., has been transferred to the position of car foreman at Biggar, Sask.

Byron Taylor, coach carpenter at the Moncton (N. B.) shops of the Canadian National, has been appointed apprentice instructor, car department.

J. Glazebrook, car foreman of the Canadian National at Biggar, Sask., has been transferred to the position of car foreman at Melville, Sask.

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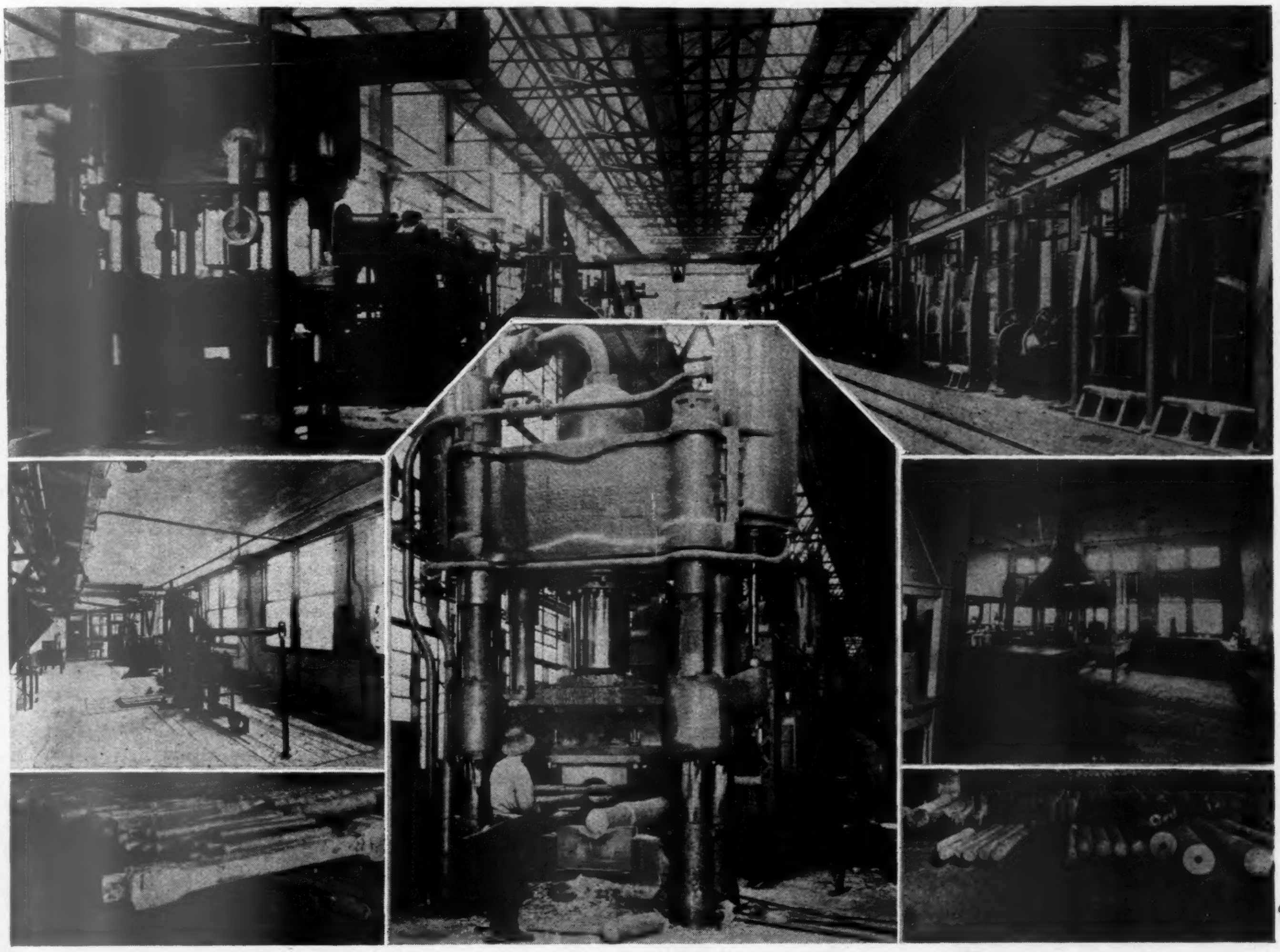

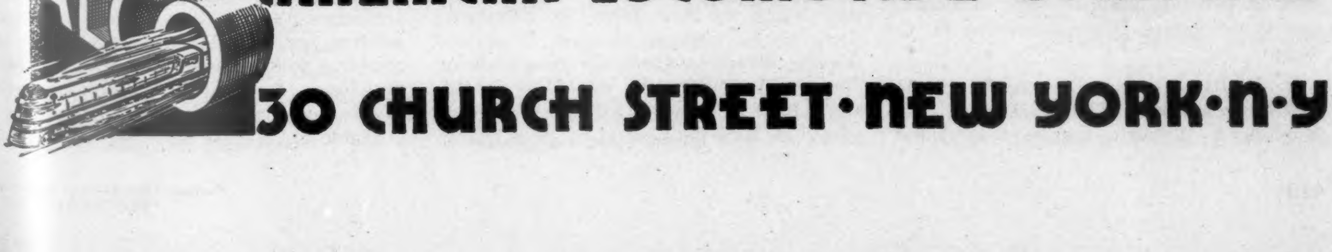

W. S. Stillwell, car foreman of the Canadian National at Melville, Sask., has been appointed coach foreman, with headquarters at Saskatoon, Sask.

A. P. Gilsdorf, assistant car foreman of the Norfolk & Western at Shaffers Crossing, Va., has been promoted to the position of car foreman at Lambert Point, Va., succeeding M. E. Jones, retired.

J. D. Thress, inspector on new equipment, motive power department, of the Norfolk & Western at Lambert Point, Va., has been promoted to the position of assistant car foreman at Shaffers Crossing, Va.

Shop and Enginehouse

Henry F. Greenwood, superintendent of shops of the Norfolk & Western at Roanoke, Va., has retired.

J. W. Snyder, machine shop foreman of the Norfolk & Western at Bluefield, W. Va., has retired.

W. E. Pierce, erecting shop foreman of the Norfolk & Western at Portsmouth, Ohio, has been appointed back shop foreman, succeeding J. H. Hahn.

A. L. Wooten, a machinist of the Norfolk & Western at Portsmouth, Ohio, has been promoted to the position of assistant machine shop foreman, succeeding G. S. DeArmond.

G. S. DeArmond, assistant machine shop foreman of the Norfolk & Western at Portsmouth, Ohio, has taken over the duties of gang foreman in the erecting shop formerly handled by E. G. Goeller.

L. E. Berry, night enginehouse foreman of the Norfolk & Western at Bluefield, W. Va., has been promoted to the position of day enginehouse foreman at Portsmouth, Va., succeeding E. W. Meredith.

A. N. Myers, gang leader in the machine shop of the Norfolk & Western at Bluefield, W. Va., has been promoted to the position of foreman of the machine shop, succeeding J. W. Snyder, retired.

Sennett Holmes, night assistant enginehouse foreman of the Norfolk & Western at Bluefield, W. Va., has been promoted to the position of night enginehouse foreman, succeeding L. E. Berry.

L. E. McCorkle, shop inspector of the Norfolk & Western at Portsmouth, Ohio, has been promoted to the position of night assistant enginehouse foreman at Bluefield, W. Va., succeeding Sennett Holmes.

E. G. Goeller, gang foreman in the erecting shop of the Norfolk & Western at Portsmouth, Ohio, has been promoted to the position of erecting shop foreman, succeeding W. E. Pierce.

E. W. Meredith, day enginehouse foreman of the Norfolk & Western at Portsmouth, Va., has been promoted to the position of general foreman, with headquarters at Columbus, Ohio, succeeding H. C. Wyatt.

R. L. Black, master mechanic of the Radford and Shenandoah divisions of the Norfolk & Western, has been appointed superintendent of shops, with headquarters at Roanoke, Va., to succeed H. F. Greenwood, retired.

J. H. Hahn, back shop foreman of the Norfolk & Western at Portsmouth, Ohio, has been transferred to Roanoke, Va., as foreman of the machine shop, succeeding E. C. Gaines, deceased.

Purchasing and Stores

C. J. Kubler has been appointed general storekeeper of the Kansas City Southern with headquarters at Pittsburg, Kan.

U. K. Hall, general purchasing agent of the Union Pacific at Omaha, Neb., has been reappointed general storekeeper at Omaha.

B. B. Brain, purchasing agent of the Kansas City Southern at Kansas City, Mo., has retired from active service after 33 years with the company.

E. H. Hughes, who has been appointed purchasing agent of the Kansas City Southern, with headquarters at Kansas City, Mo., is 47 years old and has been connected with the company for more than 26 years. He first entered railroad service on July 6, 1906, with the Chicago, Burlington & Quincy, serving in various capacities with this company. In September, 1908, he went with the Missouri Pacific, serving as a laborer at St. Louis, Mo., until 1909, when he was appointed sub-storekeeper at the same point. In October, 1909, he was sent to Pueblo, Colo., as storekeeper. On February 1, 1911, Mr. Hughes entered the service of the Kansas City Southern as storekeeper at Pittsburg, Kan., continuing in this capacity until July, 1917, when he became chief clerk to the general storekeeper at the same point. On July 15, 1920, he was appointed general storekeeper at Pittsburg, which position he was holding at the time of his appointment as purchasing agent.

E. H. Hughes

Obituary

William Alter, former general foreman of the passenger car department of the Central of New Jersey at Elizabethport, N. J., died on August 25 at the Alexian Brothers Hospital, after a brief illness. Mr. Alter, who was 73 years old, had retired on July 1, 1935, after 40 years of service with the Central of New Jersey.

John P. Young, formerly general inspector of passenger car equipment of the Missouri Pacific, who retired about 10 years ago, died of a paralytic stroke on August 28 at his home in University City, a suburb of St. Louis, Mo.

Edwin C. Washburn, assistant to president of the Baltimore & Ohio, with headquarters at New York, died on August 10 at his home in Englewood, N. J., of heart disease at the age of 67 years. Prior to his appointment as assistant to Daniel Willard, president of the B. & O., in 1911, Mr. Washburn had been general manager of the Washburn Steel Castings and Coupler Company, a company founded by his father. Mr. Washburn was the inventor of many railway mechanical appliances and was a participant in the early development of the automatic car-coupling device.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers. State the name and number of the bulletin or catalog desired, when mentioned in the description.

Neoprene.—E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del., has issued a booklet describing Neoprene, an engineering material with rubber-like properties which, it is claimed, can resist the deteriorating effects of oil, heat, sunlight, chemicals and oxidation.

Alfol.—The Alfol Insulation Company, 155 East Forty-Fourth street, New York, has issued a loose-leaf booklet discussing Alfol, an aluminum foil insulation for refrigerator cars, passenger cars, locomotives, tank cars, caboose cars and other shipping containers.

Skid Platforms.—Many types of skid platforms for use in conveying materials, goods, parts and products by the lift truck method of interior transportation are illustrated in folder No. 146 issued by the Lewis-Shepard Co., 175 Walnut street, Watertown, Mass.

Shapers.—The attractive 34-page bulletin, No. 217, issued by Gould & Eberhart, Newark (Irvington), N. J., describes and illustrates G & E industrial shapers which are available in sizes ranging from 16 in. to 36 in. stroke. Universal shapers, equipped with swivelling tables and available in sizes from 14 in. to 36 in. stroke, are also illustrated.

Welding Symbols and Instructions for Their Use.—The symbols given in the 12-page booklet issued by the American Welding Society, 33 West Thirty-Ninth street, New York, are a development of the weld symbols in use here and abroad and supersede the former symbols of the society which were published in bulletin form in 1929 and revised in February, 1935. The symbols cover both fusion and resistance welding and provide the means of placing complete welding information on working drawings. A detailed explanation of the system and instructions for its use are available at 25 cents per copy.